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ABSTRACT

This document contains 12 papers on vocational education and training (VET) and related research that were developed for a 1998 European research report titled "Training for a Changing Society." The following papers are included: "Foreword" (Stavros Stavrou, Manfred Tessaring); "Institutional Framework Conditions and Regulation of Initial Vocational Training Using Germany, France, and Great Britain as Examples" (Richard Koch, Jochen Reuling); "Financing of Vocational Education and Training" (Folkmar Kath); "Demography, Labour and Training: State of Research and European Developments" (Gert Hullen); "Employment Structures and Labour Market Aspects Related to VET" (James Tatch, Cliff Pratten, Paul Ryan); "Technical Change, Work Organisation and Skills: Theoretical Background and Implications for Education and Training Policies" (Eve Caroli); "New Technologies and Work Organization--Impact on Vocational Education and Training" (Gisela Dybowski); "Costs and Benefits of Vocational Training" (Ulrich Van Lith); "Costs and Benefits of Vocational Education and Training at the Microeconomic Level" (Winand Kau); "Sector-Specific, Intermediate and High Skills and Their Impact on Productivity and Growth in Manufacturing Sectors of the European Union" (Frank Corvers); "The Future of Work and Skills--Visions, Trends and Forecasts" (Manfred Tessaring); "Information Needs for Individual Career Decisions" (Bernd-Joachim Ertelt, Gerhard Seidel); and "Apprenticeship: Dead-End Sectors and Occupations? Implications of Structural Change and New Employment Possibilities for Apprenticeship Training" (Arie Gelderblom). (MN)

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Vocational education and training – the European research field

Background report 1998

Volume I

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FOREWORD

Research in the field of vocational education and training (VET) - as in other fields - is one of the fundamental pre-conditions for the adoption of appropriate policies by the various actors at different levels of our societies. Thus, research has two main functions: firstly, to produce information and knowledge and secondly, to help to improve a given situation or to prevent it from deteriorating. The production and service or transfer character of research is particularly evident in research on education and training. The central aims of VET research could be defined as follows:

- to describe and explain the conditions for acquiring and updating vocational skills and the structures and processes involved;
- to provide information on the interactions between VET and other areas of social action - in particular the labour market. Those interactions concern the legal and institutional framework, interdependencies with social, economic, technological, cultural and demographic change and the behaviour of the different actors in these fields;
- to demonstrate its relevance to the search for options and the decision-making of the various protagonists in VET: individuals, policy-makers, the social partners, legislators, practitioners and administrators.

The difficulties encountered in gaining an overview of European VET research are due to, among other things, the fact that a number of different academic disciplines are involved - economics, sociology, pedagogics and educational science, psychology, technology, *industrial relations*, etc. Furthermore, research done in other countries is not always perfectly transparent due to, among other things, language problems, lack of knowledge about education and training systems abroad and the fact that national and international networks for fostering communication on scientific matters are still not fully developed or operational. Last but not least, although many of the problems are similar, the proposed solutions, based on theories, approaches and methods, are often rather different even within one discipline and one country.

They are the main reasons why Commissioner Édith Cresson asked CEDEFOP in 1996 to put together an overview of the state of the art of European Research on Vocational Training as the beginning of a regular reporting system. With this pilot issue, CEDEFOP starts the reporting system and it is planned to publish comprehensive research reports every two years. The reports should provide information on the main theoretical and conceptual approaches and the empirical findings of VET research in different countries and disciplines. Furthermore, the reports should also make recommendations and reach conclusions - for researchers on research gaps and research done in Europe, and for decision-makers at various levels to take into account relevant research findings. It is hoped that the reports will improve cooperation both within the research community in different countries and between researchers, policy-makers, practitioners and a wider public.

As regards this pilot issue, given the limited time and funds available on the one hand and the wealth of research material throughout Europe on the other, it was impossible to cover all aspects of European VET research. Therefore, the report will have to be updated regularly and supplemented with new topics which have not been sufficiently addressed here or which may emerge in the future.

The editing of this report would not have been possible without the active participation of experts in different fields of VET research. Furthermore, valuable comments and support came from a number of CEDEFOP's research partners, from the European Commission and the Management Board. We would like to express our thanks to all of them, and of course also to those colleagues who undertook the strenuous work of translating, editing and organising this publication.

In keeping with the structure of the extended synthesis report published by CEDEFOP[1] in 1998, the contributions in this background report are grouped into five main fields of research: institutional and political background; socio-economic framework; the processes of training, continuing training and integration to work; curricula and learning; and aspects of comparison, mobility and recognition of skills in a European perspective.

The institutional and political background of (selected) VET systems in Europe, including funding arrangements are addressed by the contributions of R. KOCH / J. REULING and V. KATH. They deal with institutional forms of cooperation and coordination between different actors at different levels of VET policy, with the different approaches and concepts of steering VET capacities and quality and with the determinants, systems and instruments of funding VET in the European context.

Eight contributions are devoted to the socio-economic framework and in particular to some of the most crucial problems of our times: labour markets, technologies, the costs and benefits of training and the future of work and skills. Concerning the supply side of labour markets, G. HULLEN starts by giving an overview of the long-term population trends and the impact of demographic change on education and training in the European Union. Looking at the demand for labour, J. TATCH / C. PRATTEN / P. RYAN focus on the performance of European VET systems in terms of labour markets and skill requirements. E. CAROLI analyses the main factors of the skill/labour nexus: new technologies and work organisation from a macro-economic point of view. Also, G. DYBOWSKI presents research results on the impact of technologies and work organisation at the level of enterprises, also based on several case-studies. The contributions of U. v. LITH and of W. KAU discuss several controversial aspects of the definition and assessment of the costs and benefits of vocational training from the points of view of macroeconomics, the enterprise and the individual. In this context, F. CÖRVERS deals with the difficult questions relating to the empirical measurement of the impact of different skills on productivity and growth in manufacturing sectors in the European Union. The second part concludes with a summary by M. TESSARING of research results on the future development of work and skills, including a survey of available forecasts.

The third part deals with training processes, transitions to work, continuing training and the problems of target groups. B.-J. ERTELT / G. SEIDEL discuss the information needed for the individual choice of training and work, and call for a more appropriate vocational guidance taking into account the processes of decision-making. A. GELDERBLOM touches upon the question whether apprenticeship training in different countries takes place in innovative and growing sectors and so provides future-oriented skills. B. CLASQUIN / F. GÉRARDIN / V. TORESSE provide an overview of the research on transitions from training to work and concentrate on the organisation of the transition process with a number of actors involved. The contribution of D. MÜNK / A. LIPSMEIER presents the background and structures of continuing vocational training (CVT) as well as an analysis of the CVT situation in European Member States. Concluding this part, I. NICAISE / J. BOLLENS discuss the training and employment problems of disadvantaged groups and call for an adequate consideration of their specific problems in training and employment programmes.

The fourth part presents research on curricula, learning formats and non-formal learning. P. KÄMÄRÄINEN / J. STREUMER present an overview of different concepts of key skills, competences and qualifications in order to ensure flexibility; they propose a European agenda for the development of core curricula. G. A. STRAKA / M. STÖCKL discuss the role and possibilities of new media in the learning process and focus in particular on the furthering of self-directed learning. J. BJØRNÅVOLD, starting with approaches to learning and knowledge acquisition, looks at the identification and assessment of non-formal learning in and outside the workplace and in particular at questions relating to legitimacy.

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[1] CEDEFOP (ed.): Training for a changing society. A report on current vocational education and training research in Europe (author: Manfred Tessaring), Luxembourg 1998, 294 pp. ISBN 92-828-3488-3 (English version) [also available in German, French and Spanish].

Part five is devoted to some 'overarching' aspects in the European context: comparisons, mobility and recognition of skills. The concepts and issues of comparative research in VET are presented by U. LAUTERBACH / W. MITTER; they advocate the integration of hermeneutic and phenomenological approaches on the one hand and of analytical-empirical methods on the other in order to understand the subjects of comparison and to proceed to intercultural comparisons. S. KRISTENSEN discusses the possibilities of and the obstacles to mobility in Europe and concentrates on transnational placements as an integral part of training. He recommends that previous experience of placements should be better evaluated and that their quality and scope should be ensured by recognising foreign training modules in national training programmes. Migration of the labour force the European Union is in the focus of the empirical analysis - based on the European Labour Force Survey - carried out by P. DESCY / M. TESSARING. They confirm the rather limited scale of migration across the EU and present some figures on the educational level of nationals compared to both EU and non-EU migrants. The last paper by B. SELLIN presents a chronological review of the efforts made in the Community towards a common vocational training policy, in particular by improving the comparability and recognition of training standards.

The broad field of research in vocational education and training research in Europe is by no means exhausted in this report. But it is hoped that the reviews of current research on a number of issues contained here will help to enhance transparency and cooperation and at the same time form the basis of a regular reporting system. Future reports should, for example, discuss in more detail issues such as steering problems in changing societies, research on the impact of national and transnational training programmes, the problems of mismatch and social exclusion on the labour market, and research done on the recruitment and training behaviour of enterprises - to mention but a few.

Stavros Stavrou	Manfred Tessaring
Deputy Director of CEDEFOP	Project Co-ordinator

INSTITUTIONAL FRAMEWORK CONDITIONS AND REGULATION OF INITIAL VOCATIONAL TRAINING USING GERMANY, FRANCE AND GREAT BRITAIN AS EXAMPLES

Richard KOCH, Jochen REULING (BIBB)

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1. APPROACH AND DEFINITION OF SCOPE OF RESEARCH

The framework conditions for initial vocational training[1] differ in the various EU Member States. The forms of initial vocational training are also many and varied, as is the manner in which they are regulated.

The aim of the present paper is not to describe how the various national vocational training systems in the EU are organized.[2] Instead, it will deal with the impact that the statutory, institutional and political framework conditions for vocational training have on the way the various systems are regulated. "Regulation" has been introduced here as a generic term to cover all the factors influencing the implementation and outcomes of vocational training in either a quantitative or qualitative manner. These factors include not only state regulations and other intervention of state authorities, but also measures taken by the social partners as well as influences resulting from market mechanisms or social conventions and tradition.

The paper is divided into three sections. The first part is a survey of theoretical approaches to the regulation of training systems. The second describes the findings of research into the social and institutional framework conditions of vocational training and covers the basic patterns for regulating the capacity and quality of vocational training systems. The third part deals with the ever-increasing influence the European integration process is having on the way national vocational training systems are structured.

Any presentation of the research findings must take one of two approaches: 1) treatment of particular aspects without dwelling on national specifics, with findings from individual countries serving only as illustrations, or 2) intensive analysis of a few selected Member States. This report takes the second approach, permitting more profound comparative analysis. It covers the three largest EU countries and focuses on the following systems of initial vocational training which have played a central role in recent debates on vocational training policy and comparative vocational training research in Europe:

- The dual system in Germany[3] as an example of an enterprise-based training system regulated in a corporatist way;
- School training in France as an example of a school-based training system regulated by the state;
- The British system of national vocational qualifications as an example of a training system which in many important ways is largely regulated by the market.[4]

This restriction is also justified by the fact that these systems cover in an exemplary manner almost the whole range of ways in which vocational training is institutionally organized in Europe.[5]

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[1] In Member States which do not differentiate between initial vocational training and continuing vocational training, the scope of the study refers to the vocational training of young people.

[2] Cf. CEDEFOP publications on individual countries.

[3] Specific problems connected with the introduction of the dual system in the new *Länder* had to be omitted due to lack of space.

[4] The following description of training in Great Britain refers solely to England in specific questions of training certificates and the training market. The Scottish education and vocational training system has certain peculiarities which cannot be addressed here. The systems in Northern Ireland and Wales are very similar to that in England. However, the differences are increasing, both with respect to the regulatory framework and the characteristics of the various qualification systems (Oates 1997).

[5] Current typologies assign the above-mentioned training systems to different fundamental models. For example, Drake (1991) differentiates between market-led and training-led systems of vocational training on the basis of the relationships between training and the labour market. He subdivides the latter category into school-based and industry-based systems. Greinert (1990) defines three basic types of formal vocational training on the "role of the government" criterion
- market model where the government plays no role or a marginal role in vocational qualification processes,
- bureaucratic model where the government alone plans, organizes and controls vocational training,
- government-regulated market model where the government establishes framework conditions for private training providers.

Real-life vocational training systems are always hybrids. In addition, several basic institutional forms of vocational training frequently coexist in EU Member States. School-based training systems predominate in the EU Member States. cf. Structures of the Education and Initial Training Systems in the Member States of the European Community, EURYDICE and CEDEFOP, Brussels: Eurydice European Unit, 1991

2. REGULATION OF VOCATIONAL TRAINING SYSTEMS AS A SUBJECT OF RESEARCH

Systems theory approaches conceive of vocational training in isolation from its environment as a social action system which is geared to dealing with a specific social problem (Luhmann/ Schorr 1979). Analysis inspired by this approach involves a high level of theoretical abstraction and leaves action-theory perspectives out of the picture, although these aspects are keys to an understanding of the mode of operation and dynamics of development of vocational training systems.[6]

This requires a concept of analysis which incorporates the interaction between the macrolevel of institutional structures of a vocational training system, the mesolevel, where professional associations forge compromises in the interests of their constituencies and the microlevel, where the training providers and training consumers meet, and it involves the interaction of this complex with other social subsystems. It also attaches significance to accounting for the mechanisms and institutions inside and outside the system which steer the processes of vocational training.

The role of the market and the state has traditionally been the crux of the international debate on how vocational training systems should be regulated. Two basic theoretical standpoints are distinguishable:

One theoretical position, following the tradition of neoclassical national economics, argues that the market is the most efficient form of regulation. It therefore favours de-regulation in vocational training as well as in other areas. The sole, indispensable task of the state is to establish conditions allowing the (vocational training) market to function optimally to achieve market equilibrium. Appropriate forms of government intervention exist, e.g. in defining, evaluating and recognizing qualifications, supervising the quality of training programmes, reinforcing the relationship between qualifications and payment and improving the cost accounting of vocational training institutions (e.g. OECD 1991).

The alternative position proceeds from the understanding that an undersupply of training on the market cannot be prevented by market-supporting intervention alone. The proponents of this standpoint believe that a training supply which is considered insufficient from a social perspective is mainly caused by the very fact that enterprises are free to choose whether or not they want to offer training, which systematically leads to "market failure". This view advocates supplementary market intervention measures such as institutional arrangements to discourage phenomena like poaching (recruiting of successful trainees by companies that provide no training) (e.g. Finegold/Soskice 1988, Finegold 1992, Soskice 1993, Marsden 1995).

In the 1980s "neocorporatist research" in the social sciences extended research perspectives by analysing the regulatory functions of the professional associations and the social partners. On the one hand, professional associations may contribute to the regulation of vocational training systems by participating in the decision-making processes of the state. Such participation of professional associations benefits government decision makers because "...the expertise and objections of politically relevant social groups are integrated as early as possible into the political and administrative decision-making process so that ultimately decisions will be made that are both objectively correct and conducive to a consensus." (Streeck 1994)[7]

Besides involving professional associations in government decision-making processes, the state may also completely delegate certain public regulatory tasks to these organizations. According to Schimank/Glagow (1984) the three most important forms of non-étatiste social self-regulation are:

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[6] The term "vocational training system" is not used in a narrow, systems theory sense but as a pragmatic definition of a social functional context which relates and interacts with other sectors of society (e.g. general education, continuing education, labour market).

[7] See also Cohen/Rodgers 1992

- *"Subsidiarity", as state-supported self-regulation*: Social regulatory problems are delegated to organizations to be dealt with autonomously. An example of this are the funds financing vocational training in France, which the social partners manage jointly.
- *"Delegation", as state-ordered self-regulation*: Regulation by bodies established under public law by act of government and requiring certain players to participate. An example is provided by the German chambers, economic or professional self-regulatory organs which assume the functions of accreditation of training enterprises, quality control and certification.
- *"Corporatism", as negotiated social self-regulation*: Interest groups organized in professional associations negotiate (compromise) solutions to problems of social regulation. In the area of vocational training, this is mainly negotiations between employer associations and trade unions. Collective agreements can either take the place of or pave the way for government regulations. One example is the establishment of benchmarks for regulating state-recognized training occupations by the social partners in Germany.

All three forms of non-government regulation are characterized by the fact that professional associations mediate between the state and individual enterprises and/or prospective trainees and that the state has to ensure the institutional organization of collective social interests by helping with organization and delegating authority.

The basic positions in the international policy debate on the regulation of vocational training have been summarized as follows by Skinnigsrud (1995): "The main dividing line in the policy debate on training has been drawn between those who favour voluntarism and those who favour various collective arrangements. Voluntarism implies that decisions on training should rest exclusively in the individual company concerned. Collective arrangements imply that companies are either obliged to take part in training or contribute to the costs of training for the whole workforce. These obligations can either be enforced by law or by arrangements between the social partners." (p. 74)

The formal division of responsibility among the various players involved in the public regulation of vocational training only establishes the ground rules for their actual "game". The outcome is influenced by the fundamental modes of interaction (e.g. conflict versus consensus orientation) and the interests being pursued. The individual groups do not necessarily have a uniform objective or interest. Thus, in the majority of the large EU Member States, the government acts through a variety of national, regional and local institutions. The same applies to the social partners, which also have horizontal and vertical subdivisions whose opinions and interests might clash.

3. PRESENTATION AND INTERPRETATION OF RESEARCH FINDINGS

3.1 Institutional entrenchment of vocational training

The structure and the way a country's vocational training system functions are essentially governed by the institutional framework in which it is imbedded and by other interdependent factors.

3.1.1 Relationship between various routes (partial systems) of vocational training

Young people in Germany, France and Great Britain may undergo vocational training under various, totally separate institutional systems. The dual system is so dominant in Germany that it is often believed to be the training system of the country, overshadowing school-only training at full-time specialized vocational schools. The same applies to the school-based training system in France, which overshadows traditional apprenticeships.

The British situation is more diversified, making an overview more difficult. In England only the national vocational qualifications (NVQs, since 1986) and the general national vocational qualifications (GNVQs, since 1990/91) are regulated at national level, but not the form of training or the places where these qualifications can be acquired.

The government would like to see the GNVQs and NVQs as the future standard certificates for the vocational training of young persons and adults.[8] These, along with the A-levels as the general education certificate (university entrance qualifications), form the national qualification framework for training after completion of compulsory schooling. The NVQs currently compete with the traditional qualifications offered by a large number of commercial certification societies and professional bodies. At the moment, three times as many of these certificates are awarded as NVQs (Robinson 1996). A distinction in training sites and types of training is made between school/college-based and work-based routes. The former, full-time school-based training system is increasingly geared to obtaining GNVQs.[9] The second training route should not necessarily be equated with in-company training. The NVQs, geared to concrete occupational activities in the employment system, can be obtained not only in enterprises, but also at colleges of further education and private training agencies as well as in various forms of cooperation between colleges and enterprises. Since 1989 there has been a steady decline in the number of under-18-year-olds enrolled in work-based training. Work-based training has become increasingly the domain of young people over the age of 18 who begin training after completion of general education or full-time vocational training school (Richardson et al. 1995a).

The individual training streams tend to focus either on vocational fields or they cater for specific segments of vocational training for certain groups of trainees. In Germany there are few instances where the dual system and full-time schools compete in the same field. The qualifications that can be acquired vary (recognized training occupations and school-taught occupations). In France, training at a full-time vocational school (lycée professionnel) competes with apprentice training. Both forms lead to the same certificates. However, overlapping rarely occurs since apprenticeships are common in only a few economic sectors (so far). The recently observed expansion of in-company training contracts leading to higher vocational certificates (e.g. tertiary education entrance qualifications in specific vocational fields) has aggravated the issue of competing programmes. Educational policy has responded to this challenge by dismantling institutional borders between full-time vocational schools and apprentice training centres (CFA). The former can now function as an apprentice training centre on the basis of an agreement with the region involved and the responsible economic organizations (e.g. chambers) (Ministère de l'éducation nationale 1994). In Great Britain the GNVQs are tailored to average performers, while the NVQs (at the two lower levels of the scale) are aimed more at school leavers with poorer results wishing to qualify as fast as possible for a job in an enterprise.

Apart from the above-mentioned standard forms of vocational training, Germany and France have launched state-sponsored vocational orientation and qualification programmes, particularly for disadvantaged and unemployed young people. The number of these programmes, especially those in France, have reached considerable proportions. In the mid-1980s, 70 per cent of French school leavers made use of such assistance during their first three years of employment (Verdier 1994). The programmes were specific responses to an impasse on the labour market. Initially temporary measures, they had to be continued even after the situation on the labour market improved. In Germany, a "programme for the disadvantaged" was institutionalized and put on a legal footing. Despite frequent retailoring, support measures have become a permanent instrument in France. A crucial function of such programmes is absorbing young people who are either unable to find a training place in the normal system or have insufficient skills for the labour market. These programmes have the additional function of giving state support to companies recruiting and integrating young people after training in schools in order to lower labour market entrance hurdles for young people who would otherwise be hard to place.

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[8] The objection could be raised that the GNVQs more readily fall into the category of general educational qualifications since practical skills are not taught in these courses, or if they are taught, to a very limited extent only. When it comes to both the contents and the certificate-holders, the difference between GNVQs and NVQs is greater than between GNVQs and general education courses.

[9] GNVQs are primarily offered in vocational fields such as art and design and business; this accounts for the school-based form of training in these areas.

In Great Britain the Youth Training Programme (YT)[10], introduced in the late 1980s, and the Modern Apprenticeship and Accelerated Modern Apprenticeship[11] programmes, launched in 1994, were conceived from the outset not only as anticyclic measures to remedy the poor labour market situation but also as important state instruments to promote the formal vocational training of young people in general. These schemes can be interpreted as a reaction to the skills gap which developed due to the insufficient scope of formal in-company qualification measures.

In the countries we are dealing with, the forms of vocational training for young people have tended to diversify. This poses the questions of whether this is a general trend and what circumstances might have triggered the development. It seems reasonable to interpret the vocational training streams as necessary elements in meeting similarly more diversified socioeconomic challenges. Educational policy therefore faces the basic problem of ensuring the coherence of the overall system. The balance between differentiation and coherence of vocational education and training systems should also be seen as an important field for vocational training research.

3.1.2 Social evaluation of vocational education and training

The appeal of vocational training compared to higher general education for those who have to choose between these options depends to a large extent on the perceived subsequent earnings and career opportunities, the social prestige associated with the occupation and the opportunities for further educational development that are opened. Since those who complete vocational training tend to face poorer earnings prospects and chances of advancement and run a higher risk of unemployment than university graduates, the "road to riches" in the educational systems of the countries being studied has traditionally passed through qualifications that entitle university entrance. The elimination of class barriers to higher education since the 1970s has exposed vocational training systems to stiff competition with other educational streams for the better scholastic performers. If only poorer school performers become more and more likely to enrol in vocational training, this will also have an impact on the appeal of the vocational training system to employers. The future of vocational training systems therefore depends to a great extent on the ability to make them sufficiently attractive to the higher achievers. Parity of esteem of general and vocational training paths has therefore been an important objective of educational policy in Germany, France and Great Britain for a number of years.

The three countries reveal distinct differences in the social status of vocational training in comparison to general education paths. Vocational training has traditionally enjoyed higher prestige in broad sections of the German population than in France and Great Britain. One possible explanation is that Germany enjoys different educational traditions and places different value on manual labour. Another explanation is a difference in educational traditions and value judgments on manual labour. "Meritocratic thinking" pervades the employment system in Germany less than in some other countries, for example, France (Lutz 1991), where access to middle-level occupational status is closely tied to a person's level of school qualifications (Drexel 1995). The comparatively low social esteem attached to industrial labour in France has had its impact on the appeal of training paths leading to jobs in industry (Ministère de l'Éducation Nationale 1994). Structural changes in the employment system may also have an effect on the standing of initial vocational training. France and the United Kingdom have traditionally recruited more school-leavers from general education schools than Germany for the growing service industry.

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[10] Youth Training replaced its 1980s' forerunners. It is aimed at 16- and 17-year-old school leavers and guarantees on-the-job training in an enterprise and at least 13 weeks' off-the-job training to all applicants. The objective is achievement of an NVQ, usually at the second skill level.

[11] The programmes are geared to enriching NVQs at the third level of achievement (comparable to vocational certificates of the German dual system) with broader theoretical knowledge and relevant key skills. The idea of combining NVQ and GNVQ units is behind these improvements. Although no training duration is specified, the "modern apprenticeship" will probably tend to be two and a half to three years for 16-to-17-year-old school leavers and ultimately converge on a shorter period for the accelerated modern apprenticeship for 18-to-19-year-olds (Richardson et al. 1995a, p. 44).

Despite a multitude of various efforts, particularly in the recent past, France and Great Britain face formidable problems in constructing a vocational training system which can win esteem in the mainstream of society. In Germany, by contrast, the thrust of educational policy in recent years has been ensuring the appeal of the dual system to highly capable pupils and enterprises.

An important objective for comparative European vocational training research is finding general and country-related factors which influence and could change public esteem for vocational training. This might be achieved by a comparative evaluation of the measures Member States have introduced to enhance the appeal of vocational training.

3.1.3 Consultation and selection in connection with access to vocational training

Transferring from a general education school to vocational training upon completion of compulsory schooling requires choices and decision making by young people looking for training and involves selection processes on the part of the education system or providers of training. Young people may experience the choice of vocational training either as a "positive orientation", or a "negative orientation" following problems at school.

In Germany, the type of school one enters in the subdivided educational system after primary school is an important turning point determining one's subsequent educational career. Attending a lower or intermediate secondary school usually leads to in-company vocational training. Entering an upper secondary grammar school (stage I) normally leads to university entrance qualifications. Parents' wishes are increasingly taken into account in selecting the educational path following primary school. Nonetheless, individual federal Länder retain various procedures which affect and even limit this choice. Measures range from school counselling without obligation to school stream recommendations, which can be reviewed after probational courses if parents disagree (Max-Planck-Institut für Bildungsforschung 1994). Public vocational information centres provide orientation on vocational training opportunities. Vocational guidance per se is provided by Federal Labour Office specialists. Their recommendations are based to a great extent on local and regional availability of training places.

Vocational and in-company training have traditionally enjoyed high prestige in many parts of the population, and they are more than a last resort for those who fail at school. This is demonstrated by the fact that the share of the population of the appropriate age enrolled in the dual system climbed to almost two thirds of young people in the second half of the 1980s and has not dropped below 60 per cent since then.

The German dual training system is characterized by the fact that the only formal prerequisite is that candidates have completed their compulsory schooling; entrance is not contingent on academic achievement or other aptitude criteria. An individual's chances to select a specific training occupation and a training enterprise are determined by the situation on the regional training place market. Access to popular occupations and training places in large enterprises is always very selective. Companies' criteria for accepting apprentices vary, however, and depend somewhat on changing relationships between supply and demand. A certain number of young people with poor school results and the socially disadvantaged are left by the wayside in competition for scarce in-company training places, making many of them dependent on state-supported off-the-job training programmes (Stender 1989).

Since the 1980s parents' wishes have been given greater weight in decisions concerning secondary schooling in France, too. Nevertheless, the process of school career selection (orientation) continues to be dominated by the school. Parental wishes are submitted to a class council, consisting of the school principal, all teachers of the class, pupil and parent association representatives and a school career counsellor (conseiller d'orientation) who has a background in psychology. Parents' appeals are decided on by an arbitration commission (Caroff/Simon 1988). Individual counselling is ensured by a nationwide system of Centres d'Information et d'Orientation (CIO). Since the guidance system is subordinated to the national Ministry of Education, educational counselling overshadows vocational counselling.

In France transferring to a vocational training course is generally considered to be "a sanction for inability to continue along the King's Highway of general education schools" (Willems 1994). Those who are pointed in the direction of vocational training courses are pupils who have failed in their school careers or whose performance is deemed inadequate for the standard general education path. The degree of previous school failure is the primary yardstick determining the level and field of the training course to which a young person is assigned.

In Great Britain, local vocational counselling centres (career services) are at young people's disposal. In addition, vocational counselling services exist in the schools, in colleges of further education and in the training and enterprise councils (TECs) which are responsible for the appropriation of funds to the various state-run training programmes. However, objective and independent counselling would seem to be a difficult task for institutions which are competing among themselves to attract the largest possible number of participants.

The most important factors determining access to particular educational paths are the final results in the General Certificate of Secondary Education (GCSE) at the end of secondary stage I, as well as the number of subjects taken, the grades acquired and subject combinations selected. Going on to the keenly sought A-level courses requires five or more GCSEs with grades from A to C[12]. Admission to GNVQs is influenced by the recruitment strategies of the schools and Colleges for Further Education. These are interested in attracting as many young people as possible and placing them in various courses corresponding to their aptitude. School leavers with mediocre grades usually wind up in courses leading to a GNVQ. Poor grades in school mean training leading to NVQs at the two lower levels of achievement. Especially in the first half of the 1990s young school-leavers who were unable to find a job were given support in projects which also led to the acquisition of NVQs. These projects were financed by the Youth Training Programme. The individual training providers received their funding according to the number of NVQs their protegés received. This probably led to training providers employing selection strategies based on school performance. If participants drop out of training or acquire a job after obtaining a certificate, they still have the option of taking advantage of the broad spectrum of courses offered by public and private providers of full-time or part-time education which make it possible for them to acquire final vocational qualifications. Access to NVQs on the basis of an employment contract presupposes participation of enterprises in the NVQ system and the availability of corresponding jobs in these companies. Employees in small and medium-sized enterprises rarely have an opportunity to obtain NVQs because the system is not very attractive to these firms for cost reasons and because as a rule they have no systematic human resources development policies (Ashton 1993).

In all three countries school performance is a key determinant of further educational and occupational careers, and specifically of whether a person will embark on a path of higher education or take up vocational training. In France, vocational training is only begun as a rule when a pupil has failed more or less seriously at school (èchec scolaire). In Britain as well, the work-based learning route is considered to be the last recourse, especially at the two lower levels of achievement (Richardson 1995a). In Germany, many upper secondary school leavers regard dual-system training in certain sectors such as large corporations and in certain service occupations as an attractive alternative to university study.

In this respect, an important research line would be to examine what impact varying system configurations have on selection processes and equality of opportunities in education systems. A comparison between Germany and France suggests the hypothesis that vocational training which is not embedded in the school system shows greater heterogeneity of selection criteria since other criteria apart from school performance are deciding factors in obtaining access to vocational training courses (Koch 1998). The case of the German dual system, which has no formal entrance requirements, suggests that these inputs partially offset the selection effects of general education schools. The structure of the educational system also determines individuals' opportunities to make up for educational deficiencies at a later date in order to obtain certificates needed to continue their education. In this respect, modularly structured systems seem to entail greater flexibility than systems organized along the lines of fixed educational tracks.

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[12] Young people and adults, too, have an opportunity to repeat examinations at a later date to improve their grade average.

From the angle of training providers or the state, there is a conflict between encouraging personal preferences and talents on the one hand and utilizing training capacities on the other, a conflict which is resolved in different ways, depending on the system configuration. Despite increased rights of potential pupils and trainees and their parents to chose an educational route, education and career counselling have a more or less obvious steering influence in all the countries under review. Their task is to balance demand for specific training opportunities with available capacities. This is especially true of the school-based training system in France, where the capacities can be increased or decreased only over the medium term due to the high fixed costs. In the German dual vocational training system trainees can only be placed in training places for those training occupations which are offered by enterprises in the region. In Great Britain, TECs must tailor their counselling to the training opportunities in the region. Vocational guidance offered by the colleges not only has the function of selecting but also a marketing-of-education function. Efforts to democratize educational choice could be thwarted by a growing intransparency of training programmes in Great Britain if independent educational and career guidance cannot be assured. Little is currently known about the impact of education markets on an individual's selection of a specific educational path.

3.1.4 Transition from vocational to general and higher education

For a long time education systems in all three countries reflected the distinction between social classes. Higher education and university studies were usually reserved for children of a small social elite, while the children of other classes only received elementary education followed by vocational training of varying lengths for some. A large percentage entered the labour market with no vocational training (Pair 1994). Since the 1960s, above all in France and Germany, there have been increasing demands for equal opportunities in education. To achieve these ends, switching between vocational and general educational paths was to be made easier and vocational training and general education qualifications were to be given equal formal status to improve the chances of those applying for advanced courses.

Until the 1970s, the French education system was characterized by the fact that the choice of a vocational training path, once made - by preference or by constraint dictated by difficulties in school - was a dead end. In order to render vocational training more attractive to better pupils as well, the formal permeability of the education system has been substantially increased. New bridging classes (première d'adaptation) make it easier for participants in the school-based vocational training programmes to transfer to grammar school upper classes. Since the introduction of a separate vocational training track leading to a (vocational) certificate of qualification for tertiary education, it has been possible, in principle, to go from vocational training into university. The prospects for former vocational trainees of continuing their education in attractive tertiary courses[13] have been limited by the high selectivity and competition with holders of the baccalauréat technologique or baccalauréat géneral.

In Germany, the roadblock between vocational training paths and advanced general education tracks lacked permeability for a long time. However, participation in the dual system opened further educational opportunities leading to middle management positions. To promote equal opportunity in the education system and prevent a sustained loss of popularity of the dual system in view of an ongoing expansion in education, the equivalence of vocational training and general education has been increased. The final certificate from a part-time vocational school in the dual system is accepted under certain circumstances as equivalent to completion of upper secondary schooling, stage I. Moreover, most German Länder have issued regulations permitting admission to university of students with initial and continuing vocational training but no Abitur, i.e. standard formal university entrance qualifications. Nevertheless, considerable hurdles must be taken before persons qualified only by vocational training are admitted to university courses.

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[13] The primary examples are two-year training programmes leading to the BTS (*brevet de technicien supérieur*) or the DUT (*diplôme universitaire de technologie*).

In Great Britain, the two vocational training paths provide unequal chances of admission to advanced education. GNVQs cover entire vocational fields and contain a large portion of general education subjects. They are granted at three levels of achievement (foundation, intermediate and advanced). Those who obtain an advanced GNVQ have a real chance of being admitted to university. In the case of NVQs, trainees are only required to learn a small amount of theoretical knowledge, just enough to perform the duties associated with the occupation. De facto, holders of an advanced NVQ therefore find it difficult to enter higher education. The English government is taking steps to give advanced GNVQs and NVQs equal status with the A-levels of the general education path in order to facilitate lateral and vertical mobility among all three educational paths right up to university.[14] Another measure being considered is a system of credit accumulation and transfer[15] which would permit more options for combining general education, vocational education and occupation-based modules.

All three countries have in the meantime clearly eased, or are planning to ease, the formal requirements for transferring from vocational to higher education courses and obtaining higher qualifications. In reality, however, this has not led to equality of vocational and general education certificates since all institutions of higher education attach utmost importance to the level of general education of their prospective students. Research findings from comparative studies on how the various nations' approaches to promoting transferability affect the demand for vocational training are not available.

3.1.5 Relation between initial and continuing vocational training

Initial vocational training can no longer provide the job skills needed until retirement because occupational requirements are changing so rapidly. The evolution of occupational structures forces many workers to change occupation once or several times in the course of their working lives. Continuing vocational training is becoming more important. The function of initial vocational training is also in transition.

In Germany, the objective of training under the dual system continues to be seen as qualifying young people to obtain entrance to the labour market as a skilled worker. Full capacity to handle demanding skilled blue- or white-collar jobs is usually only achieved after a phase of on-the-job induction of varying lengths, often in conjunction with continuing training courses (Parmentier 1996, Tessaring 1996). In France, continuing training assumes the functions of socialization in an enterprise and job familiarization, which are accomplished in Germany by the dual system (Drexel 1995). It is up to the companies to build on the basic theoretical qualifications their workers acquired at vocational school. Enterprise expenditure for initial and continuing vocational training is distributed differently in Germany and France in accordance with the different roles they play.[16] The British vocational training system makes no formal distinction between initial and continuing vocational training. Training leading to general vocational certificates (GNVQs) is the principal way in which trainees are given a broad preparation for their place in the working world. Among young people, obtaining GNVQs is gaining ground on the acquisition of NVQs, oriented to particular occupations.

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[14] It is highly debateable, however, whether these qualifications will really be considered equal.

[15] Credits are awarded for the successful completion of a module. The number of points acquired depends on the level of difficulty of the module, its scope and its contents. Obtaining a vocational training certificate requires a certain number of points. It is possible to add up the points from modules of varying levels and educational paths.

[16] In Germany in 1990, company expenditure on initial training accounted for 2.75% and spending on continuing training for 1.88% of its wage and salary total (BERUFSBILDUNGSBERICHT 1993, p. 188 f.). During the same year in France enterprises dedicated 3.2% of their total payroll spending to vocational training - primarily for continuing training (Willems 1994, p. 98). It is estimated that British companies spent at least 3% of the gross national product on training their staff (Marsden 1995).

The function of vocational training for young people is increasingly considered to be a basis for entering an occupation and for further learning parallel to the job. Taking the given structures of initial and continuing vocational training as the starting point, the Member States have elaborated remarkably different approaches to implement this change of role of vocational training. One objective of European vocational training research should be to analyze these processes of change and compare their effectiveness. The German dual training system gives rise to the hypothesis that altering the function of training does not automatically lead to a departure from the skills of an occupation and an overload of school book learning.

In Germany and France advanced vocational qualifications have become more important for access to middle management and executive positions rather than promotion by rank, which was common in the past (Drexel 1995). In Germany the vast majority of appropriate qualifications are obtained through continuing training following an apprenticeship and several years of experience in the occupation, e.g. master craftsman, technician, specialist economist (Fachwirt). Numerous enterprises, especially in the craft trades, industry and several service sectors (particularly commerce, banking and insurance), pattern their internal career tracks on such continuing training qualifications and help finance them under widely varying schemes. However, many sectors of the economy and occupational fields still lack established career paths which can be related to continuing training certificates. In light of a less favourable labour market situation more and more graduates of specialized institutions of higher education compete for middle management positions with persons who have completed their training under the dual system and continued to upgrade their qualifications. The advantages of recruiting the former are their higher level of general education and the fact that the costs of their training are borne by the state. In the 1960s France opted to cover the growing demand for middle-level qualifications primarily through school-based initial vocational training at an advanced level (BTS/DUT) (OECD 1994). As a result, recent decades have seen a gradual divorce of continuing training from career advancement (Germe/Pottier 1996).

Theoretically, British modular systems of occupational and general vocational certificates permit vertical and diagonal educational careers up to levels corresponding to university qualifications. Both adolescents and adults can at any time have their course-acquired and/or job experience-related qualifications certified at different levels of achievement. The extent to which NVQs at higher levels of difficulty can be translated into job promotions depends primarily on the extent to which enterprises use the certificate system as an instrument of human resource development.

The tendency to uncouple continuing training and career advancement, as evidenced by the French situation, stimulates expansion of higher general education at the expense of vocational education and training. The existence of state-regulated continuing training courses would seem to be a keystone of vocational training popularity at the skilled labour level in systems with regulated vocational training courses. If middle technical and managerial positions are filled, as in France, primarily by graduates of tertiary education programmes, this impairs the upward mobility of employees with vocational training at the skilled-worker level.

3.1.6 Relation between training and the youth labour market

The social and private benefits of investment in vocational training depend primarily on the extent to which the qualifications, once acquired, are used in the employment system (Büchtemann 1994). Phenomena such as youth unemployment significantly exceeding the rate for adults or widespread employment of young people in jobs below their level of training indicate problems in the coordination of training and the labour market. A comparison of the proportion of unemployed young people in EU Member States reveals striking differences. In 1995 the figure for unemployment of persons under 25 varied from 8.8% in Germany to 15.9% in Britain and 27.3% in France.[17] It would be jumping to conclusions, however, if we were to attribute a high or low level of unemployment among young people exclusively to the shortcomings or strengths of different training systems. Other crucial determinants include the structure of the (youth) labour market and the way it functions in connection with the prevailing ways in which enterprises recruit junior staff.

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[17] cf. EUROSTAT Arbeitslosigkeit 10/96, p. 10

Government regulations on compulsory education stipulate the minimum working age. In France, Britain and Germany full-time schooling is compulsory up to the age of 16. German law also requires 16- and 17-year-olds to attend school part time. This explains why no labour market for unskilled minors has developed in Germany.

The main reasons given in *France* for the grave problems young people face in finding their first job (*chômage d'insertion*) are:

- the alienation of the school-based training system and the employment system,
- the large proportion of young people with no vocational qualifications, and
- legal or collective-agreement constraints on the labour market which increase the costs of induction of young employees with no job experience and the costs of giving notice if this should become necessary (Erbès-Seguin 1990).

In France a youth labour market tending strongly toward a secondary labour market has developed. A significant share of young French men and women alternate between precarious employment situations and unemployment. This affects young people with no vocational training, but also many who have completed vocational training. Atypical forms of employment (including temporary jobs) have become much more prevalent (Erbès-Seguin 1990).

Young people with vocational qualifications at the skilled worker level, seeking access to the more stable sectors of the labour market, face direct competition from school leavers with a higher level of education as well as from experienced workers, both employed and unemployed. To improve their competitive position, they must attempt to reach as high a formal education level as possible. The way the market works for those seeking their first job is thus seen as a significant force behind the expansion of education in France (Verdier 1995).

French employers have been encouraged by the growing youth unemployment to give school leavers jobs requiring fewer qualifications than they have acquired during their training. Since training certificates have only been partially introduced as features of wage categories in French collective bargaining agreements, they do not constitute barriers to this practice (Jobert/Tallard 1995). Another trend is giving preference to school leavers with superior vocational educational certificates (university entrance and higher). Among other things, this preference for the "overqualified" is designed to reap benefits by saving the induction costs for school-trained, but not immediately employable junior workers (Jallade 1988).

In Germany the market for first-job seekers who have completed their training under the dual system is characterized by two major factors. The first is the training place market. This is part of the labour market in one respect; it has the function of preselecting skilled workers for the future. The second factor is the government recognition of training occupations. Umbrella agreements usually cite completion of a traineeship as the decisive criterion for skilled worker level. The final training certificate does not constitute an automatic entitlement to be employed at skilled worker level. If persons who have completed the dual system find jobs in the occupations for which they were trained, they are normally entitled to at least the starting pay for skilled workers (standard wage) as well as to certain social insurance benefits which semi-skilled and unskilled workers are denied.

The German vocational training certificate as a condition for access is the reason the transition of young people into the workforce takes place in a relatively demarcated first-job market, structured and "protected" by collective agreement provisions.[18] These institutional conditions give young people a major incentive to complete the dual training system.

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[18] Institutional factors affecting the formation and stabilization of occupationally specialized labour markets in Germany are treated in Reuling 1997.

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When the labour market situation deteriorated, it changed the terms of access to employment for graduates of the dual system. A final training certificate was no longer a sufficient credential for obtaining a steady job. The certificate now only provided a certain number of options, which, although backed by collective agreement regulations and company policies, were contingent on varying relationships of supply and demand on the labour market.

The prevalence in Britain of apprentice training, at least until the 1970s in manufacturing and technical fields, led to occupationally well-structured labour markets. The widespread withdrawal of enterprises from this form of training brought about an increase in company- and job-specific training courses for internal labour markets. In some sectors, where management tended to favour low-skills options for reasons of short-term profitability among others, this engendered "secondary" labour markets for menial jobs with low pay and little job security or skill upgrading opportunities as well (Ashton 1993).

There seems to be a close correlation between the type of vocational training and the dominant youth labour market form in the different countries. Major factors explaining the differences in youth unemployment rates seem to include the extent to which qualifications obtained in one enterprise are recognized by another and the degree to which institutionalized opportunities exist for transferring from training to employment.

French-style school-based training systems and acquisition of GNVQs in Great Britain typically involve a relatively lukewarm recognition of final certificates and a comparative lack of institutionalized transition paths to occupational practice. Certificate holders must compete with adults and better-qualified peers for access to corporate job markets. Internal labour markets shield those already employed and raise the entrance barriers for young people. Young people, especially poorer-performers, run a severe risk of being relegated to secondary labour markets.

Company-based forms of training, like the German dual system are usually linked to a job offer since the enterprises are interested in internalizing the benefits of training. In the dual system, public regulation of training certificates and subsequent continuing training certificates foster the development of occupationally specialized labour markets. Occupationally specialized labour markets are credited with the following virtues: they provide an incentive for the employment of young people, reflect relatively clearly defined first jobs and predictable careers, thus providing better protection for young people against displacement into unorganized labour markets (Marsden/Ryan 1990).

Findings on the relationships between institutionalized forms of initial training and forms of youth labour markets can furnish important inputs for the planners of educational policy and labour market participants. In view of the positive impact of occupationally specialized labour markets on the transition of young people from training to employment, identifying the factors instrumental in creating or stabilizing this form of labour market can safely be considered a significant research issue. Another important subject is identifying the consequences that a departure from occupational specificity in initial vocational training have on the way youth labour markets function.

3.2 Basic forms of cooperation and decision making in forming education policy

The most important characteristics of the institutional regulation of vocational training systems include the distribution of roles between the state and the social partners and the distribution of regulatory functions between national and regional or local levels.

3.2.1 Roles of the state and the social partners in decision-making processes

In *Germany*, the social partners have a far-reaching impact on government educational policy, in particular in defining, implementing and monitoring minimum quality standards for the in-company segment of vocational training. The overall advantages of this role of the social partners in Germany are summarized by Streeck (1983) as follows: The employers' associations' expertise facilitates well-founded government decisions. Employer and trade union umbrella organizations help to clarify and focus the interests of both parties, contributing to the coherence and standardization of the training system. They relieve the government in the difficult chores of finding compromises and building a consensus. Although the unions were granted an equal say in major national and Land bodies regulating vocational training under the Vocational Training Act (BBiG), the employer associations maintain a key role since the enterprise-based dual system gives training companies the primary responsibility for implementing and financing vocational training.

In France, the social partners have only an advisory capacity in formulating vocational training policy (Verdier 1996). Based on the premise of state sovereignty in the area of education, the national education ministry virtually monopolized decisions in the area of in-school vocational training for many years. Control of the entire school system by the Paris Ministry of Education (Ministère de l'Education nationale) conformed to the tradition of centralist government organization. The social partners have subsequently been consulted to a greater extent in government decision-making processes in the area of school-based vocational training. This change was dictated by recognition that the state must take the interests of employers and employees into consideration to gain greater acceptance of its decisions in the economic sector. However, so far, one still cannot speak of a division of responsibility in the area of school vocational training. No fundamentally new ground rules for coordinating government and the social partners' efforts has developed (Lassere 1994).

In Great Britain, the Conservative governments in office since the late 1970s have sharply curtailed trade union influence on vocational training and attempted to construct an employer-dominated regulatory system (Green 1995). The trade unions and the educational community have equally little say in defining national vocational qualifications. A conspicuous peculiarity of the new policy is the fact that this responsibility was not assigned to the employers' established Industrial Training Organizations but to the newly created Industrial Lead Bodies, at least half of whose members represent enterprises and which are constituted either for a single sector of the economy or for more than one branch and are appropriately accredited by the Ministry for Education and Employment. Criticism focuses not only on the number of Lead Bodies, considered to be too large, but also on their insufficient incorporation of feedback from enterprises in the sector when elaborating occupational qualifications and on their delegation of work to private consultancies, which limits the willingness of companies to adopt the standards (Beaumont 1996, CBI 1994)[19].

The nations under review display strikingly different forms of cooperation between the state and the social partners in regulating their training systems. They range from "social partnership" in the German dual training system, to the social partners' consultant role in France, to employer dominance in Great Britain.

The institutional form of the training systems under review is one factor that explains the different degrees of the social partners' involvement in the decision-making processes in education policy. In an enterprise-based training system like the German dual training form, the government's scope for implementing policy is narrowly confined by system-imposed restrictions. However, the school-based training system in France does not permit the government to bypass the social parties because this would jeopardize the acceptance of the vocational training certificates on the labour market. The British training system gives the central role to the market participants. The government sees itself mostly as the underwriter of education market competitiveness. To improve the transparency of education market opportunities, the state accredits national qualification standards, which are, in the case of NVQs, primarily defined by employers.

As far as the dual system is concerned, the definition of public interest in vocational education and training is mainly the outcome of negotiations between employer and labour organizations. In France, the government defines the public interest after hearing both sides. In Great Britain, cautious steps towards corporatism based on consensus were made in the 1970s, but these have been supplanted in the 1980s and 1990s by the spread of a neoliberal political approach (Clarke et al. 1994). The lack of a significant trade union impact on vocational education and training could impair the effectiveness of British vocational training policy since this policy area can hardly be divorced from other policy areas (e.g. collective bargaining policy) where the unions exercise negotiating power (Green 1995).

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[19] The Lead Bodies are supposed to merge with the Industrial Training Organizations to achieve greater effectiveness and enterprise acceptance of NVQs.

The social partners' organizational and political clout can be regarded as another factor determining their role in vocational training policy. The influence of the social partners in Germany is partially based on their capacity for association self-regulation and their ability to find compromises. The structure of organized labour (non-partisan industry-based unions, sectoral unions) works against any particularist, politicized imposing of interests. In France, the willingness of unions to cooperate among themselves on vocational training, among other things, is stunted by ideological conflicts. Moreover, the employer camp is divided organizationally into the Federation of Manufacturing Employers (CNPF), which primarily represents the interests of big business, and the Association of Small and Medium-Sized Entrepreneurs (CGPME) (D'Iribarne/Lemaitre 1987). In Great Britain neoliberal ideology hampers collective action and the organization of sectoral interests in the field of vocational training. The government provides no institutional framework for the organization of industrial relations (Green 1995, Soskice 1996). Moreover, the trade unions are hamstrung by jurisdictional disputes and rivalries (Clarke et al. 1994).

The structure of employer and employee interest groups and the quality of industrial relations apparently affect the extent and orientation of labour and management involvement in vocational training. The government can strengthen the regulatory functions of the social partners by furnishing appropriate organizational aid. The institutional prerequisites and the effects of organizational forms representing social interests on the efficiency of public regulation of vocational training are research topics which will become more significant for two basic reasons. First, the government cannot handle the role of sole regulator due to the growing dynamics and complexity of structural change in the economy and society. Second, there is a trend toward a weakening of organized interests due to individualization processes in society, which would have an impact on the existing systems for taking educational policy decisions.

3.2.2 Relation between centralized and decentralized decision levels

Germany, France and Great Britain have different traditions in the way state authority is distributed between the central and lower levels. This also shapes the decision-making processes in vocational education and training. The ways in which institutions solve the existing tension between national standardization and regional variety differ greatly.

In France, vocational training is moulded by the general tradition of state centralism. Processes of devolution of the centralist administration and of decision-making responsibility to the regions established in 1983 strengthened the regional regulatory level considerably. The most important objectives of this shift were: better gearing of vocational training to economic trends and more effective coordination of training and employment. The sharing of responsibility between the central government (including subordinate agencies) and the regions requires negotiations in planning training place availability by appropriate channelling of scarce public funds. It leads to complex decision-making procedures. A so-called planning agreement summarizes the whole set of medium-range measures promoting the economic, social and cultural development of a region, which are to be sponsored by the central government and the region. The regions were given responsibility for building, equipping and operating lycées, including vocational schools (lycées professionnels). The Ministry of Education and the subordinate school authorities continue to decide on the opening and closing of training courses and the allocation of teaching staff. The central government therefore remains responsible for the coherent development of vocational training (CEREQ 1993).

In Great Britain the decision-making authority of the national level has been increased since the mid-1980s. London now determines the objectives of vocational training, authorizes vocational standards, develops criteria for quality assurance and mobilizes financial resources for public and private training providers.[20] The regional level distributes the financial resources and monitors their use. The Youth Training programme is operated by a total of 104 Training Enterprise Councils and, in Scotland, by Local Enterprise Companies. The main task of the TECs is determining the skill requirements of the regional economy, evaluating the providers' training programmes and channelling Youth Training financial resources to the providers and enterprises which offer training matching the regional demand for qualifications.

In Germany, the distribution of responsibilities between the different levels of government is moulded by federalism. The federal government sets the general framework conditions and the objectives and content of in-company training on the basis of the Vocational Training Act. The content and personnel for training in part-time vocational schools are the sole responsibility of the Länder. The counties (Landkreise) and local authorities decide on spending for materials and investment for vocational schools. The particularization of the responsibility for setting standards for the dual training system creates a strong need for coordination between the federal government and the Länder. The latter demand strict respect for the "cultural sovereignty" granted them by the constitution. The Standing Conference of Land Ministers of Education and Cultural Affairs contributes to uniformity of the in-school component of dual vocational training. The economic chambers play an important role in regulating vocational training at a non-central level. These bodies not only perform official functions; they also influence the training place supply of their members by providing information and recommendations. Moreover, they are the sponsors of interplant vocational training centres.

A certain convergence in the degree of decentralization in decision-making powers with ongoing differences in the institutionalized form can be observed in the three countries. While the German separation of powers between the federal government and the Länder has remained intact in accordance with the federal system of government, in Great Britain and France the balance between central and decentralized levels of control has shifted - in opposite directions. In Great Britain the traditionally strong emphasis on local control has been reversed in favour of the formation of a standard framework, creating uniform conditions for the vocational training market. In contrast, France has shifted decision-making responsibilities from the central government to the regional regulatory level in order to increase the flexibility of training programmes. In all three it is the prime task of the central level to define the generally binding standards for vocational training, while the regional and local levels are given the job of actually regulating the supply of training. The French case shows that decentralization is a complicated process, making it necessary to reconcile contradictory demands. The goal of high sensitivity to regional and local requirements clashes with the goal of maintaining the coherence of the vocational training system. While the educational policy decision processes and institutions have been investigated many times at national level in Germany, France and Great Britain, providing a multitude of findings, not all of which are up to date, the processes of regional and local control of vocational training have been sorely neglected as a research topic until now.

3.3 Regulation of training capacity

3.3.1 System-related regulatory structures

In *Germany* enterprises may train persons under 18 in government-recognized occupations only and in accordance with the stipulations of the Vocational Training Act or the Crafts Code. A number of standards must also be met. Companies must demonstrate that they have a trainer who is qualified by character and knowledge of the trade. The number of trainees must be in proportion to the number of skilled employees. The dual system is characterized by the fact that individual enterprises are not obliged by law but are free to decide whether to offer training or not. However, employers as a group bear joint responsibility for providing an appropriate number of in-company training places. Particularly in times of increasing training place demand, the free interaction of forces alone is generally insufficient to supply all young people desiring training with a training place. Supplementary government measures are required in the form of subsidizing additional in-company training places and external training capacities, primarily to reduce the negative effects of training market selectivity on disadvantaged adolescents.

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[20] This is generally valid despite certain differences between England, Wales, Northern Ireland and, particularly Scotland.

Responsibility for regulation of capacity in the French school-based training system is entirely vested in government agencies. They face the task of balancing the number of training places with the number of potential trainees and the economy's manpower requirements while budgeting the scarce financial resources allotted to personnel, facilities and training materials well in advance and distributing them fairly and appropriately among the different training courses, occupations and school locations. In accomplishing this task, they must harmonize the requirements for internal rationalization of the school system with the partially contradictory external variables - demand for training and the labour market.

The deconcentration of government administration of education and the transfer of central government responsibilities to the regions result in a specific network of centralized and decentralized planning and decision processes. The regions have been assigned the task of ensuring the coherence of various types of vocational training programmes (apprenticeship, vocational schools, post-secondary training courses, qualification programmes for unemployed youth). This function is assumed by a plan régional de développement des formations professionelles, for which business and organized labour are consulted (Richard 1995). Training in schools is still under the control of particular school districts (rectorats). They determine the structure of training courses offered by the schools, while trying to harmonize national educational policies and regional planning priorities. The autonomy of individual specialized vocational schools has been cautiously expanded. Medium-term plans of action (projets d'établissement) allow schools to focus on local training requirements.

The impact of the economy on the regional supply of training places for particular training courses depends on the extent to which funds from the training levy paid by companies (taxe d'apprentissage) can be distributed in controlled fashion nationally and regionally. Since 1993 employer associations, regional councils and school authorities can sign contracts (contrats d'objectif) laying down common objectives in developing training opportunities and raising the necessary funds. Schools benefit from the contracts through more steady financing than would be the case if each school had to fend for itself. However, by the mid-1990s these new approaches had not yet become widespread and their significance can therefore not yet be assessed (Bel/Besses/Miriot1996).

In England 16-to-19-year-olds are confronted with an in-principal "open training market". In the area of the school/college-based learning route to GNVQs, government policy since the early 1990s has focused on increasing the institutional diversity and amount of competition between the schools and colleges involved. In addition to fostering competition, the national financing system influences the colleges' selection of occupations and levels of training. Allocation of funds depends on the number of enrolments, the length of enrolment and the number of formal qualifications awarded. For this reason, colleges attempt to attract as many young people as possible to their training programmes. However, they also try to place the less promising applicants in less demanding courses in order to reduce the dropout rate (Richardson et al. 1995b).

Some work-based training route courses are offered by companies, but more are provided by colleges and private training organizations. Company training can be oriented to NVQs but it may also lead to certificates which are not nationally recognized, or be limited to training that meets only specific company requirements. Currently only 7 per cent of all enterprises participate in the NVQ system. Most of these are large corporations (Spilsbury et al. 1995).

Contrary to initial intentions, most NVQs are not obtained on the job. At present, 70 per cent of NVQs are awarded by colleges. Some local alliances between colleges and companies or between companies and private providers exist. Whenever the training leads to nationally recognized certificates, instruments of government financing programmes play a role. The Youth

Training programme finances approximately 75 per cent of the lower and semi-skilled-level NVQs obtained by persons aged 16 to 19 (Richardson et al. 1995a). So far company and college NVQ programmes at the intermediate level are comparatively rare. Finegold/Soskice (1988) attribute this to three factors: 1) too few British companies produce and sell high-quality products; 2) this limits the demand for well-trained staff; 3) even in areas where there is a demand for better-qualified workers, enterprises invest too little in vocational training. Training companies face the pivotal problem of poaching of trained personnel by other firms. To retain former trainees, they tend to offer training which is only applicable to their business.

Overall, the combined effects of insufficient demand for vocational training, insufficient training opportunities and insufficient demand for intermediate-level personnel has led to a "low-skill equilibrium" (Finegold/Soskice 1988). New government programmes such as the Modern Apprenticeship in particular should help increase the opportunities for upgrading skills. This programme, which is geared to acquiring Level 3 NVQs and also includes some GNVQ examination units, is proving very successful and is attracting increasing numbers of participants.

3.3.2 Educational planning and market regulation

In the countries being investigated, the regulation of training opportunities follows a different logic, characterized by a specific relationship between market control and government planning. In the school-based French training system a state-planning logic dominates. The German dual system functions on the basis of government framework regulations complementing a training place market, while the British system operates on the basis of a comparatively little-regulated vocational training market. Each of these patterns is associated with certain risks of misregulation.

The capacity of the school-based training system in France must be determined by government planning. Since the skill requirements of the economy can only be forecast crudely, the demand for training assumes the role of the basic planning input. The preference of young people for the highest obtainable school-leaving certificate matches the efforts of specialized vocational schools and educational planners to raise the prestige of vocational education and training by increasing the standard of training programmes. Due to the high fixed costs, educational planning must incorporate the goal of fully utilizing resources - school buildings, teacher qualifications and training resources - which can hardly be changed in the short run. Planning of capacities entails the risk of "government mismanagement" of the demand for training (inappropriate placement) and of the labour market (inappropriate qualification). These structural pitfalls could only be partially offset by a reform of the planning procedure. The compulsory training levy provides individual enterprises and employers associations with certain tools to influence what training places are offered by the schools in the various occupations at the different levels of proficiency. Relations between specialized vocational schools and companies cannot, however, be called a "market". The high youth unemployment rate alone demonstrates that these relations do not provide adequate signals of demand for regulation of training capacities.

The self-regulation mechanisms of the training place market allow the German dual training system to react relatively swiftly to short-term fluctuations in training place supply and demand. Large discrepancies between supply and demand, which may have diverse, sometimes mutually reinforcing causes (business cycle, demographic trends, shifts in educational demand) overtax the balancing mechanisms of the training place market. It can happen that some would-be trainees are not accommodated and certain training places find no takers. The training place market is an imperfect market since reaching a market equilibrium through price adjustment (particularly training remuneration) and quality is restricted by public regulations. The social partners could make training attractive by an appropriate increase in training pay and by proposing higher quality standards to legislators. In the recent past, however, the opposite problem of market failure with respect to demand has prevailed due to a scarcity of training places. Government intervention has primarily served the purpose of offsetting this weakness (Koch 1998).

The neoliberal orientation of vocational training policy pursued in Britain since the late 1970s prohibits, in principle, direct state intervention in the market. The concept of a free training market involves the expectation that the price and quality competition between providers will furnish society with training opportunities in a particularly efficient manner. Accordingly, past British governments have not imposed any compulsory regulations for vocational training on enterprises, despite insufficient training activity in the economy. Instead they have limited themselves to appeals to the private sector to make a greater vocational training effort (Clarke et al. 1994). Government intervention in the training market has been mainly aimed at increasing its efficiency and providing incentives for providers and consumers of training.

The proper functioning of the training market in Great Britain is impaired by the lack of transparency of the availability of training opportunities, which is created by the diversity of training providers operating in competition with each other and the variety of certificates. The introduction of nationally recognized vocational training qualifications is intended to clear the jungle of opportunities for upgrading occupational qualifications, giving individuals seeking training and companies a better view. To develop the channels for obtaining national certificates, the government is financing in various programmes appropriate training measures offered by public and private training providers as well as enterprises. The companies' dominant role in the TECs, which implement the programme, puts them in the driver's seat in steering the training market, - and selecting suitable providers (Bennett 1994). The original intention of the government to gradually replace state financing of the scheme by private-sector self-financing to increase their sense of responsibility for the vocational training of their future workforce has not yet materialized. Overall, government intervention has made little progress in correcting the "failure" of the market to provide sufficient training programmes for young people.

Faith in market mechanisms as particularly efficient instruments of flexible adaptation of training place availability to the requirements of society and the economy is widespread, especially since the opposite concept of (centralized) government planning of education stumbles over structural barriers when the demand for training and skills undergoes dynamic change. In view of the risks of market failure, an important field of research which is highly relevant for the formulation of educational policy is the analysis of how education markets function. Examples such as the British vocational training market and the German training place market suggest the hypothesis that the "free interaction of forces" must be supplemented by public regulation to achieve the number and type of training opportunities required by society and to mitigate the socially unacceptable effects of selection.

3.3.3 Incentives for company training commitment

The intensity of government intervention in companies' training programmes is much greater in Germany than in Great Britain. Likewise, a much higher percentage of young people receive training in Germany than in Great Britain.[21] These findings pose the question of whether Germany has a more favourable institutional environment or greater incentives for company training efforts than Britain.

In Germany, enterprises may train minors in government-recognized training occupations only. British counterparts are subject to no such general constraints when it comes to training. The NVQ system can be consulted for orientation on a voluntary basis. In contrast to Germany's dual system, however, the NVQ system imposes no regulations for how training should be conducted.

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[21] In Germany about 90 per cent of all 16-, 17- and 18-year-olds attended general education or vocational schools (including part-time vocational schools in the dual system) from 1985 to 1989. This contrasts with 65-70 per cent in Great Britain. In Germany 56 per cent of the workforce had intermediate, nationally recognized vocational training qualifications in the 1985-89 period. The figure for Great Britain was only 20 per cent, leaving 63 per cent with no vocational qualifications, compared to 26 per cent in Germany (Clarke et al. 1994).

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The relationship between training costs and benefits can be considered a significant factor influencing the level of commitment of enterprises to training. The German dual training system is characterized by cost sharing by training companies, trainees and the state. The government covers part of the costs in that the Länder and municipalities finance the school-based component of training in full and allow companies to treat training costs as tax-deductible business expenses. Trainees share the financial burden by accepting pay which is only 25 to 35 per cent of that earned initially by young skilled workers. Smaller companies can often recover training costs from the income from the productive work of trainees, especially in the second and third year of their traineeships. Larger concerns often incur high net costs due to the fact that their training courses are to a large extent conducted outside the production process. These costs are offset only by hard-to-quantify benefits (e.g. a lower risk of filling jobs with poorly qualified workers). In Great Britain the trade unions were not willing to maintain low pay for young trainees in the framework of the traditional apprentice system. This reluctance was primarily due to a concern that young people could replace adult workers as "cheap labour" (Marsden 1995). In Germany this danger is countered by the participation of the unions on equal terms in negotiating minimum standards and by the works councils' rights of supervision.

Companies will reduce their commitment to training if they expect their trainees to be poached by firms which do not offer training. In Great Britain "free-riding" has been identified as a major reason for the demise of apprentice training and continues to be an obstacle to a strong commitment of free enterprise to vocational training (Marsden 1995, Clarke et al. 1994, Soskice 1996). In view of the fact that in Germany only about one third to one quarter of all enterprises offer training, the unions are demanding replacement of the principle of almost complete company self-financing of training by a national training levy[22], so that the costs of training are also borne by companies which do not train. Employer associations are categorically opposed to this suggestion because they foresee higher incidental wage costs and fear erosion of the decision-making autonomy of their enterprises. However, they do agree to agreements which provide for the creation of additional traineeships without increasing costs (e.g. by lowering trainee pay).

The way the labour market works affects the chances that enterprises will reap adequate returns on training investments. The occupationally structured labour markets in Germany, supported by the dual system, and the large number of trained skilled workers available increases the odds that companies will be able to replace specialists who have taken jobs elsewhere with equally well-qualified personnel. The lack of a strong commitment of British firms to training exposes them to a greater threat of poaching (Marsden 1995).

The extent to which employers are organized as a group is generally considered to be an additional determinant of company commitment to training. German enterprises are more organized that their British counterparts. In Germany, government intervention in enterprises' decision-making autonomy looms when employer associations and the economic chambers are unable to muster a sufficient number of training places. In Great Britain, employer-led TECs, LECs and ITOs have not (yet) managed to wield as much sway over company training behaviour as the German chambers. Marsden (1995) attributes part of this failure to the TECs' and LECs' dependence on political decisions and government programme funding as well as to the fact that they are assigned two tasks which are only partly compatible. First, they are supposed to promote training opportunities and a pool of skills matching the requirements of the economy. Second, they are supposed to combat unemployment. The British case clearly demonstrates the difficulties of building up a company-based training system providing certified, transferable qualifications without a strong tradition of collective representation of employer interests. "...In the absence of some kind of strong institutional framework, employers will either balk at the cost of training for skills which have become more transferable, or they will seek to undermine transparency, and to confine training to the minimum currently required by the job."

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[22] In 1990, a total of almost 43 000 training contracts and 71 000 enterprises were affected by collective-agreement financing provisions. Of the latter, 20 000 offer training. The building industry is the most important branch in this respect (BERUFSBILDUNGSBERICHT 1990, p. 155).

(Marsden 1995). However, the falling rate of participation of German enterprises in dual system training also poses the question of whether the institutional environment still provides firms in this country with sufficient incentives to train their own junior staff.

The only partially successful efforts of French governments since the mid-1980s to increase enterprises' commitment to vocational training demonstrate how difficult it is to reactivate company training experience and motivation once it is shelved by a policy of entrusting training to schools. Financial incentives such as reduction of employers' social insurance payments or an option to deduct training costs from the training levy (taxe d'apprentissage), have not produced the anticipated increase in in-company apprenticeships available. Considerable bottlenecks have also developed in companies' work-experience training openings for vocational school pupils. The limited self-interest of enterprises in active involvement in school-based training can presumably be attributed to the following factors: Expansion of training services for pupils involves company expenditure with no guarantee that they are developing their own skilled workforce. Another reason is that French employers have long since resigned themselves to the state monopoly on education, relieving them of an unwanted burden (Lasserre 1994).

Providing pupils with practical training is something new for most companies. They have neither the teaching strategies nor the experience to enable them to provide meaningful activities for those who spend time at their facilities to improve practical skills (Tanguy 1991). The vast majority of French enterprises do not consider vocational training to be their social responsibility. The training levy, which goes to the apprentice training centres, vocational schools and institutions of higher education under a quota system, has a certain counterproductive effect on company commitment to training because numerous firms consider themselves to be freed from all training obligations and expect the government to furnish them with vocationally trained or at least pre-trained starting workers (Lattard 1995).

The participation of employers in the vocational training of young people is receiving more and more priority in the EU Member States even though they have a tradition of school vocational education systems. Nonetheless, enterprise training commitment is likely to be impaired everywhere by growing cost pressure. An analysis of institutional prerequisites and incentives for employer participation in providing a partially "public service" is therefore an important European research subject. It involves issues of costs and financing of vocational training, which until now tended only to be a subject of research in the area of continuing vocational training.

3.4 Regulation of training quality

There are clear differences in the institutional framework for regulating training quality in the three countries. They are summarized in *Table 1* (see page 24).

3.5 Problems inherent in the various systems and forms of quality control

In the German dual training system the fundamental problem of public steering of the quality of in-company training is reaching compromises:

- between the objective of maximum-quality training oriented to future labour market requirements and the risk of restraining the training capacity and commitment of enterprises by setting exaggerated quality standards, thus jeopardizing provision of the training opportunities required by society;
- between the demand of employers for specific skills, which are crucial training motives, and the interests of those who have completed the dual system to have their qualifications recognized beyond the premises of their training enterprise.

These conflicting requirements are resolved by the government regulating training occupations as legally binding minimum standards. Training occupations are socially negotiated patterns describing the contents of training courses geared to specific occupational fields. Minimum

standards permit employers to set their own skill focuses over and above the established quality level but nevertheless guarantee uniform minimum qualifications on the labour market.

Table 1:

Comparison of Institutional Framework of Quality Control

	Germany (Dual System)	**France (School-based System)**	**Great Britain (NVQ System)**
Training contents	Minimum standards for training courses oriented to widespread company practice	Ideal standards oriented to requirements of large modern enterprises	Examination standards based on good practices of sector
Regulation of training certificates	Negotiation of benchmarks by social partners, coordination by government body (BIBB), ministerial decree	Elaboration by government body (CPC), consultation between social partners, ministerial decree	Elaboration of employer-dominated lead bodies, accreditation by government institution (NCVQ)
Overriding training objective	Ability to perform skilled occupation (*Beruf*)	Subject-related theoretical preparation for occupational field	Ability to perform specific tasks
Organization	In-company training, sometimes including extra-plant training centres, supplemented by vocational schools	School-based training supplemented by in-company training stages (*alternance scolaire*)	Not regulated
Share of general subjects	About one third of training at vocational school	About half of training at specialized vocational schools	Only what is required to perform occupation
Duration of in-company training	About 75% of training time (averaging 34 of about 46 weeks per annum)	About 25% of training time (4-10 weeks in a 35-week year)	Place and duration of training not regulated
Regulation of in-company training	Training regulations with enforceable minimum contents	Recommendation on training contents	Not regulated
Examination	Examination board of the Chambers	State examination	Provider-prepared and administered examination
Quality control	Chambers (enterprises), school inspectorate (schools)	School inspectorate (enterprises and schools)	Internal and external verification of quality management, government inspection of colleges

The training regulations for in-company training are largely the result of negotiations between the employers' associations and the unions, coordinated by the Federal Institute for Vocational Training. The federal government issues a new training regulation on the basis of the prior agreement of the social partners on the revision. This unwritten "principle of consensus" fosters acceptance of training regulations in employer practice but it is also associated with the risk of updating being blocked or considerably delayed by conflicts of interest between the social partners.

Teaching quality in vocational schools is the responsibility of each Land. Consistency of contents of in-school training with the training regulations for in-company training is controlled by a procedure which is independently established by agreement of the federal and Land governments.

The final examination is an occupational competence examination which is conducted outside the training institution by economic chamber examination boards with equal representation. The examination covers the skills and knowledge specified in the overall training plan and the material taught at the vocational school where relevant to the vocational training course.

Standards define only a reference system for the practice of training in enterprises and schools. The major forms of state assistance for the assurance and adaptation of training quality in small and medium-sized enterprises are financial aid and support in planning inter-plant training centres. The most important instruments of government innovation promotion are pilot projects. State programmes are by principle subsidiary to the activities of enterprises, vocational schools and inter-plant training centres.

The central issue in assurance of training quality in the French school-based training system is whether the objective of training should be the promotion of occupational competence, which requires fine tuning of training contents, teacher qualifications and training resources to changes in professional practice as well as a far-reaching involvement of companies in training, or whether broad theoretical preparation for employment should be envisioned, providing a longer-term orientation to changes in qualification requirements in broader occupational fields (Lesourne 1988).

French vocational training policy adopted a new compromise between the two approaches in the mid-1980s. Although regulation of the quality of school-based vocational training in France was aligned more closely to the needs of trade and industry, it nevertheless still followed a school logic. While the skills required by the economy were taken into consideration when restructuring vocational training qualifications, the actual organization is still largely oriented towards regulation problems in the school education system.[23] Whereas the training contents are based on occupational requirements, they are formulated in such a general way that they can also be taught in the classroom situation. While enterprises carry out training stages, responsibility for the quality and control still lies with the schools.

The regulation of training certificates (diplômes) consists of national standards for final examinations issued by the Ministry of Education. The standards for the respective examinations are prepared by the consultative vocational commissions (commissions professionelles consultatives, CPC) responsible for that field. The procedure is highly institutionalized, formalized and centralized. The social partners only have an advisory function (Fourcade et al. 1992).

The focus of government measures to assure uniform training quality is on continuing teacher training and furnishing vocational schools with equipment. Jallade (1988) sees major problems in ongoing adaptation of teacher qualifications to new requirements as a significant cause for the "out-of-date status" of the school-based training system. Scarce financial resources have reduced the ability of the school-based training system to fulfil its self-imposed obligation, of teaching the knowledge and skills needed to apply modern technology. Rising equipment costs have reinforced the already existing tendency of the French vocational school system to teach scientific and technical knowledge instead of technology-oriented occupational know-how (Campino-Dubernet 1992).

Innovations in training quality are predominantly inspired, developed, tested and implemented by the national Ministry of Education. This applies even to new in-company teaching methods. However, adequate decentralized self-initiative of providers and teachers is required to adapt centrally developed training concepts to specific situations.

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[23] For example, in the 1980s the Ministry of Education reacted primarily to demands by the metalworking industry and large enterprises for a new vocational training certificate to bridge the gap between the traditional skilled-worker level and the technician level. It came up with a new type of university entrance qualification, the university-entrance-level vocational education certificate. After considering a number of possible solutions, one was selected which matched the French government's policy of the 1980s of increasing the rate of obtaining university entrance requirements and of improving the popularity of vocational training paths (Pillet 1995).

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The regulation of the quality of vocational training in the English NVQ system follows the principle of not stipulating the learning contents but the outcomes which are described as occupational competencies. Accordingly, assessment plays an salient role in the NVQ system. Where and basically within what time frame these competencies are to be acquired is not regulated, however.

The outcomes and vocational standards are not elaborated by the Industrial Lead Bodies, accredited by the Ministry for Education and Employment and in which the employers of a given sector are in the majority. Vocational standards are developed according to certain criteria specified by the NCVQ in agreement with the most important Lead Bodies and Awarding Bodies. The function of the Awarding Bodies is developing examination criteria based on the vocational standards. The NCVQ was an institution financed by the Ministry for Education and Employment which also had the task of accrediting the developed standards. In the autumn of 1997 the NCVQ was merged with the SCAA (School Curriculum and Assessment Authority) to form the CQA (Qualifications and Curriculum Authority), which is responsible for all publicly financed, non-university education and training courses.

The NVQs are certificates of completion of an average of nine separately taught and tested modules of a formalized course. A versatile methodology has been elaborated for the development of vocational standards. Moreover, each training provider must be given criteria that are as precise as possible so that they can conduct a valid internal assessment of vocational skills. However, in practice, the examinations are considered extremely unreliable and very costly (Wolf 1995). One reason is that between 10 and 40 per cent of the public financing of the vocational training programmes depends on participants' passing the examinations, which encourages abuse. The government has contracted out quality control to commercial certification societies. However, these organizations only control quality management and do not review the assessments. The impact that internal quality management and its external supervision have on training quality is regarded as inadequate (Erault 1996).

The German dual and the French school-based training systems have much in common: public regulation of training quality by generally binding national standards for learning processes, training courses and personnel, supplemented by regulations governing verification of outcomes. This constitutes a fundamental contrast to the British system, which is almost entirely outcome-directed, i.e. focused on learning results and testing of these.

Analysis and evaluation of these fundamentally different regulatory concepts is a subject for European vocational training research with important implications for educational policy. Some vital issues are: to what extent and with what consequences for the quality of training can a vocational training system be regulated purely or at least on the whole by the setting and validation of outcomes? What are the advantages or disadvantages of regulating vocational training primarily through "input standards"? The British case suggests the hypothesis that, on the one hand, regulation and control of training quality solely by specification of outcomes achieves higher flexibility of learning paths and forms of training than training systems with regulated training courses, but, on the other hand, creates greater difficulties in quality assurance. It is interesting that the British government is thinking of introducing provider-independent assessment on the basis of clearly defined inputs (learning process-related teaching objectives) to improve long-term quality of vocational training.

Another research field is comparison of validity, reliability and cost efficiency of the examination concepts identified with the various national forms of quality control. High examination costs can lessen the willingness of enterprises to provide training. The value of training certificates on the labour market depends to a large extent on the degree to which employers can have confidence in the certified qualifications.

3.5.1 Functions and effects of standards

State-defined and state-recognized national standards are the principal instrument for regulating the quality of vocational training in Germany, France and Great Britain. The way they function and their effects show striking diversity, however, since the systems are inherently different.

Training regulations in Germany's dual system lay down minimum standards for training quality. These force enterprises to invest in training beyond their own specific qualifications requirements in the longer-term interests of a qualification pool for the national economy. Other enterprises are likewise prevented from gaining competitive advantages by lowering training quality or using the trainees primarily as cheap labour.

This aspect contrasts markedly with the situation in Great Britain. NVQs are only an option for structuring company qualifications and training activities. British enterprises do not face a public mandate to establish generally valid standards which go beyond the scope of their own company-related qualification requirements. Some authors see this as a cause of qualification deficits in the British economy (Marsden 1995). NVQs have a strong structuring impact on training programmes offered by colleges and other providers, particularly when they rely on government funds from the Youth Training and New Apprenticeship budgets.

The state diplomas awarded in French schools confirm above all that course subject matter is mastered. Within the school system the diplomas serve as proof of eligibility for advanced courses. On the labour market they are more of a "signal" than a guarantee for a particular qualification (Möbus/Sevestre 1991). The diplomas and especially the level of education completed are used by employers as criteria for selecting the most promising school leavers. Practical occupational skills are developed after leaving school in internal labour markets in tune with the individual company's requirements.

An important area of European vocational training research is analysing the various concepts of standards and the related training certificates in the Member States in order to contribute to the transparency of vocational qualifications and certificates in Europe.

3.5.2 Concepts for updating standards

The different reference models for defining standards correspond to specific concepts for updating them.

In Germany, the standards tend to be oriented to widespread occupational practice. If the training capacity and willingness of a sufficient number of enterprises is not to be endangered, training regulations can only incorporate new technologies and other innovative requirements as mandatory training content if enough employers can provide the required training (with the support of inter-plant training centres or inter-enterprise training resource pools). Training regulations tend to lag behind state-of-the-art occupational practice. Only the collaboration of employers and unions can enable the government to define a suitable compromise between premature regulations, which jumps the gun on occupational reality, and belated measures, which do not help vocational training to keep abreast of rapid technological and organizational advances. In order to make training regulations more open to future requirements, training contents are now based less on the application of specific procedures and resources than on functions, leaving out references to specific technologies and products. Since the sophistication of enterprises varies greatly, this creates the problem of training in the different enterprises being of varying quality and relevance to modern-day standards. The curricula of vocational schools are customized to the regulations for in-company training.

In France large-scale enterprises and their level of technology supply the reference model for the regulation of the occupation-related element of training certificates, not the current skill requirements of the majority - small and medium-sized enterprises. The training capacity of enterprises need not be taken into account due to predominance of school-based vocational training. Training contents are formulated in terms of ideal standards, to some extent as "idéal pédagogique et techniciste" (Verdier 1996) rather than as minimum standards as in Germany. New technologies are incorporated in training regulations, at least as hands-off know-how. The training contents for in-company training stages are listed as "cans" instead of "musts" so as not to deter companies from accepting trainees.

In Great Britain the ultimate objective of training is the teaching of occupational competence. This is understood as the knowledge, comprehension and skills required to perform actual job tasks. It is supposed to include the ability to solve problems and to adapt to changing demands. NVQs are intended to be oriented to the practice in progressive enterprises in a sector or branch. This leads, at least in sectors with highly dynamic qualification requirements, to the necessity of adapting the standards constantly. If the standards are tailored to the work requirements of the most up-to-date enterprises, there is a danger that a large number of training providers will not be able to meet them. Retaining the old standards alongside the new ones increases the number of occupational certificates and reduces the transparency of vocational qualifications.

The national, system-specific patterns of defining and updating training contents and qualification standards harbour different advantages and disadvantages. Where standards are closely related to concrete activities as in Great Britain, they are particularly susceptible to obsolescence. Where certified training qualifications contain a large amount of general occupational and theoretical elements as in France, they tend to be immune to advances in company practice, but they only approximate current enterprise qualification requirements and provide companies with only modest incentives to become involved in vocational training. The concept of minimum standards guiding the German dual system fosters a socially negotiated compromise between these conflicting demands. This allows the specific requirements of the individual branches of the economy and occupations to be addressed flexibly but also ties the updating of training contents to the ability of interest groups to compromise.

Comparative vocational training research is called upon to analyze the effects of the various forms of standards on the sensitivity of vocational training to rapid change in qualification requirements. Another avenue of investigation would be the often-stated tenet that modularly structured training systems show greater adaptability than training systems with standardized training courses.

4. EUROPEAN INTEGRATION PROCESS AS A NEW CONTEXT AFFECTING NATIONAL VOCATIONAL TRAINING SYSTEMS

4.1 Harmonization or convergence of training systems?

Today's patterns of vocational training in the EU Member States have evolved historically. Some of their roots date back to the distant past. They reflect earlier issues, interests and power structures. Vocational training in any country is embedded in a more or less coherent cultural, social, economic and political context. Several international comparative social science studies have demonstrated complex interrelationships between the structure of vocational training, the manner in which work is organized in enterprises and industrial relations (e.g. Maurice/Sellier/Sylvestre 1982, Sorge/Warner 1986, Soskice 1996). The given institutional configuration creates a set of conditions for future developments. Comparative studies of vocational training suggest the hypothesis that these nationally specific vocational training development patterns foster certain reform options and rule out alternative reform approaches (Drexel 1993).

The framework conditions for vocational training in the EU Member States have widened with the European unification process. It remains to be seen what impact this development will have on the structures of vocational training systems in the Member States. At the moment we can make nothing more than speculations which researchers will have to investigate. With the emergence of the European Economic and Social Area one can assume that the differences described above between the training systems in the Member States will decrease.

One model, which would be harmonizing system structures through Community legislation, is explicitly excluded under Article 127 of the EC Treaty, however. Harmonization policy would also lack a clear reference model for construction of a "European training system". Hardly any confirmed findings are available on the efficiency of the various national training systems.

Comparative vocational training researchers find themselves facing urgent pressure from policy makers to come up with applicable findings. In view of major theoretical and methodological problems, it is doubtful, however, whether their expectations can be met. Even if there were a breakthrough allowing formation of a consensus on criteria of efficiency and operationalization of these criteria, there would still be a difficult problem of isolating and correlating the effects of vocational training systems on economic and social change.[24] As evidenced by experience in vocational training aid to developing countries, politically guided attempts to export training systems regarded as exceptionally efficient are unlikely to succeed. The World Bank now also points out that vocational training policy must be compatible with a country's economic and social environment (World Bank 1991).

A second model assumes convergence processes on the basis of more and more transnational contexts for national vocational training systems. Relevant cause-and-effect relationships have not yet been identified to any extent. An obvious possibility is viewing the competition between nations for larger shares of the world market as a major factor. The British government's Competitiveness White Paper on Education and Training cites vocational training as one of 10 factors contributing to the competitiveness of a national economy.[25] International comparative studies underline the importance of qualified specialists for the competitiveness of national industries (e.g. Maurice/Sorge 1988, Sorge/Warner 1986, NIESR 1995a, NIESR 1995b, Prais 1995). This suggests that the available pool of qualifications increases or decreases the options an economy has for developing technology and organization, thus providing or blocking competitive advantages. However, one cannot deduce a clear relationship between a vocational training system and economic competitiveness from such findings. Instead, one must favour a multipath and context-determined model of industrial development (Piore/Sabel 1989). This means that successful economic modernization models (e.g. Japan) do not clearly force world market competitors to conform, which would necessarily lead over the long run to uniformity of training systems. At any rate, no empirical evidence has been presented to suggest that economic globalization and the internationalization of technology have pointed the national vocational training structures of EU Member States into the same direction (Georg 1997). However, these processes of internationalization do present EU Member States with similar challenges. Of necessity, this increases the importance of considering other countries' successes when dealing with common problems.

In this context, transnational cooperation within the EU is an important factor which will likely allow induce convergence. Cooperation in vocational training policy promotes even more. The Community should act under Article 127 of the EC Treaty to support and enhance the programmes of Member States. European vocational training programmes such as Leonardo da Vinci are the focus of this effort. They are a platform for diverse transnational initiatives at decentralized levels, which can be forums for transfer and for developing entirely new joint solutions. This does not have to lead to identical institutional structures. Due to differences in national contexts there will never be "one best way" to mould vocational training institutions in the EU. It is instead vital to reach functional equivalence of the respective institutional solutions. A central objective of European vocational training policy must therefore be to promote the convergence of the efficiency of the national vocational training systems in meeting common challenges.

4.2 More similarity in the principles for structuring vocational training in the EU?

Marked institutional and functional differences exist between the vocational training systems in France, Germany and Great Britain. Nevertheless, some general principles for structuring these systems are common to all three countries, although they are institutionalized in different ways.

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[24] Büchtemann/Verdier 1995 survey the methodological problems of macroeconomic research approaches inherited from human resource theory, which attempt to measure the performance of educational systems by their contribution to economic growth.

[25] The other factors are employment, management, management in the public sector, innovation, fair and open markets, finance for business, communications, infrastructure and the commercial framework (DfEE and Cabinet Office 1996)

- **Public responsibility for vocational training, particularly for access to vocational training**

In France vocational training of young people is primarily conducted in state-run or state-regulated private schools and is shaped and financed to a great extent by the government. In the German company-based dual system the government has delegated the responsibility for practical vocational qualification to employers as a group and the function of quality control of in-company vocational training and certification of vocational qualifications to the economic chambers. Likewise, it has granted the social partners a large say in regulating in-company vocational training. Nonetheless, the government has ultimate responsibility for ensuring that the private sector fulfils its responsibility and provides a sufficient number of training places meeting specified quality standards. Moreover, the government supplements in-company training with instruction at vocational schools. In Great Britain as well, the government does not rely completely on the market to regulate training opportunities for young people between the ages of 16 and 19. The "failure" of the market following the demise of the British apprentice training programme forced the British government to intervene with youth support programmes and to tie financial incentives to conformance with government-sanctioned qualification standards.

- "Alternating" forms of vocational training

In Germany joint responsibility of enterprises and schools for the dual system of vocational training has a long history. Even the school-based training system in France uses enterprises more and more as a learning and experience venue which cannot be simulated at school. It is hoped that the closer cooperation of schools and companies will not only make training more practice-related but also provide school leavers with better chances of employment. Some enterprises might come to see the experience gained in the alternance scolaire framework as a first step toward in-company apprentice training. In Great Britain the organization of vocational qualification of young people is left to the initiative of each training provider. The strong task-relatedness of the national vocational qualifications (NVQs) is designed for near-the-job acquisition of corresponding occupational skills. Practice reveals various forms of cooperation between enterprises and school-based providers.

- Defining of national standards/vocational training qualifications

While national standards and vocational training certificates are permanent fixtures in the German and French training systems, the primarily market-regulated vocational training system of Great Britain has also come to recognize that nationally recognized standards are a crucial instrument to promote the transparency of vocational qualifications, show potential trainees clear paths of advancement and thus foster overall system coherence.

- "Permeability" of vocational training and general education

Switching between vocational and general education has become easier in recent years, above all in France and to a lesser extent in Germany. This improvement has involved increasing the equivalence of vocational and general education certificates as tickets to further education courses. In Germany the main impetus was a concern about the popularity of the dual system in the light of an increasing demand for higher education. In France, a different objective was pursued: increasing the number of young people meeting university entrance requirements. In Great Britain the modular educational system is basically designed to open lateral and diagonal transfer paths between general education, vocational education and occupation-based routes.

An important objective of comparative European vocational training research is to identify common points in the concepts of shaping vocational training and their effects in the different national contexts. Vocational training research can foster transnational exchange of experience with proven structural solutions and put it on a sounder footing.

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FINANCING OF VOCATIONAL EDUCATION AND TRAINING

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1. DELINEATION OF THE THEME AND METHODOLOGICAL APPROACH

This report attempts to give a rather generalized answer to the question of who funds what for whom and in what way in the field of initial and continuing vocational training in the Member States of the European Union (EU). State institutions and social groups make considerable use of vocational qualification as a means of actively overcoming unemployment and improving business competitivity. Corresponding activities in the form of a virtually indeterminate number and variety of financial support programmes and measures have been introduced at national, regional, local and sectoral levels for diverse target groups and educational processes, and it is virtually impossible to present even an approximately complete documentation of their concrete design. However, these programmes and measures do offer the opportunity of drawing up a systematic typology of existing financial regulatory mechanisms even if, in many cases, they are primarily an instrumentalization of initial and continuing vocational training as a policy to overcome or prevent existing or imminent social problems[1].

The essay focuses on an exemplary, comparative presentation and analysis of the operational features of standardized funding regulations in Denmark, Germany, France and the United Kingdom. Particular attention is focused on their influence and their impact on the quantitative volume of provision and the level of quality resulting from the training processes and the congruence of the prevailing organizational principles of the vocational training system and the financing system.

At the end of the essay a grid for the accounting of overall funding is presented schematically which, with the inclusion of human capital in the costs and benefits of vocational training, visualizes financing flows from their source to the individual target groups

2. FINANCING OF INITIAL AND CONTINUING TRAINING IN THE CONTEXT OF VOCATIONAL EDUCATION AND TRAINING RESEARCH

2.1 Monetary and institutional-organizational aspects of the funding concept

The financing of initial and continuing vocational training contains a monetary and an institutional-organizational component. The monetary aspect attempts to quantify the amounts allocated for funding in a differentiated manner according to the different funders, i.e. the State, the company, individuals, and according to public and private budgets. Through the enumeration of types of costs and funders a comprehensive picture of the overall financing system is given (Bodenhöfer, 1985).

The institutional-organizational aspect primarily focuses on the procedures - mutually agreed through a balance of interests between those participating in vocational training (State, employers' associations and trade unions) via political opinion-building and decision-making - of resource collection, resource use and resource administration with the aim of achieving the targeted vocational training goals established through consensus.

An examination of the funding system requires a fusion of the two aspects with the following result: financial resources are provided from current or future income or revenue in the form of institutional or individual support via market-driven, rule-bound, contractually stipulated or administratively planned provision of funds and payments based on the equivalence principle, or with distribution effects or relief of cost burden via public budgets which are not always completely transparent (Bodenhöfer, ibid.). From the angle of vocational training research, this necessitates statistical documentation of the amounts allocated by the different funders, systematically listed according to target groups and/or measures for the attainment of partial or total qualification goals, and completed by a description of the organization of the funding bodies in contractually or legally prescribed funding regulations.

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[1] For a synoptic presentation of such regulations on continuing vocational training see: Kohler, Alexander: Overview of financing mechanisms for continuing vocational training in Europe; unpublished manuscript for the CEDEFOP Workshop "Funding of vocational training in Europe – Status quo and Challenges for the Future", Munich, 16-18 June 1997 and: Reporting System on Access, Quality and Volume of Continuing Vocational Training in Europe, FORCE, Formation Continue en Europe/INFPC; Neuwied, Kriftel, Berlin, 1996

2.2 Information gaps and problems of method

Because of incomplete data, surveys of the financing of initial and continuing vocational training already encounter partially unresolvable problems at national level; furthermore, in the case of bilateral or multilateral comparative analysis, considerable gaps are to be found in the data on the institutional functioning of highly diverse financing systems. This is also one of the reasons for incompatible methods of cost coverage and plausible estimates of benefits.

National funding systems for vocational training developed historically. Their characteristic institutional-organizational structures are influenced by socio-economic frame conditions and philosophical-cultural background factors. This also leads to major problems of method because the lack of in-depth knowledge of the diversity of the constituent basic structure distorts the necessary understanding of the proper approach and the posing of relevant questions (Heidemann, 1996). This shortcoming also exists in this contribution where there is no concealing that presentation and assessment occur through "German eyes".

2.3 Scientific discussion of issues related to the funding of vocational training

Scientific preoccupation with issues related to the funding of vocational training is mainly guided by problem situations which are thematically defined in public/political debate. Thus, scientifically substantiated suggestions and well-considered proposals for solutions react to a manifest need or even pressure for political action whose topicality is the decisive reason why theoretical knowledge and empirical findings are not systematically and continuously optimized and updated (Bodenhöfer, 1985).

Another conspicuous feature is that political sensitivity to funding needs is only generated through quantitative supply bottlenecks but not through qualitative deficiencies; vocational education and training research has developed a number of strategies to overcome this without, however, proposing adequate financing instruments for their implementation.

3. DETERMINANTS OF NATIONAL FUNDING SYSTEMS

3.1 The economic rationality of the funding of vocational education and training

In countries in which vocational training activities essentially depend on more or less autonomous decision processes in the companies, a scientific examination of the funding of vocational training is undertaken mostly from the economic angle (an example of this in Germany is the work of the Expert Commission on the Costs and Financing of Vocational Training undertaken in 1974, and a number of subsequent surveys and essays). This approach, based on cost surveys, is applied to analyse investment and business-theory-related implications and the interconnected issues of competition and repercussions on resource allocation.

Empirical surveys of the volume and structure of costs and benefits generated in the education process and estimates of medium and long-term benefits which cannot be quantified in monetary terms, form an important basis for analyses and resultant proposals to overcome existing structural deficits in initial and continuing vocational training. There is absolutely no doubt that it is purposeful and necessary to critically scrutinize the economic rationality and efficiency of funding systems in order to explain them through economic-theoretical arguments and to justify alternative "more effective" forms of financing. But, under no circumstances, can these be explained and legitimized as a result derived only from cost-benefit considerations.

3.2 Financing regulations – the result of political decisions

In all countries of the European Union the State, companies and individuals finance different shares of initial and continuing vocational training by assuming different proportions of direct and indirect costs in mixed systems. That is why the term "co-financing" or "co-investment" is used in this connection. However, nowhere is there an equal match between the benefits obtained by the individual funders and the amounts they have contributed. This means that national financing systems for vocational education and training originate from a fundamental political decision which - by determining the main funder– discloses who, in the opinion of society, is considered to be the main beneficiary of vocational training.

The outcome of this is that the financing complex is more or less firmly integrated in the respective legal framework set up through social consensus, within which the organization of political opinion-building is established and the political field of action of the actors defined through institutional regulations.

3.3. The influence of economic and social developments on the financing of vocational education and training

Vocational training does not have the same status in the different European countries. There is a general tendency to give it less importance than general education paths leading to higher levels of education. This discrimination is offset by the mutual realization that it should play an important role in the solution of economic, social and labour market problems. A broad range of measures providing financial support for vocational qualification processes for youth or for the creation, adaptation, improvement or enhancement of the vocational qualifications of employed or unemployed persons in the form of State programmes or on the basis of agreements between employers and trade unions, is oriented to the goal of reducing current unemployment and combating imminent unemployment and thus making a contribution to the securing or the increase of the performance capacity and competitivity of the economy.

The political reaction to the changed frame conditions in vocational education and training resulting from globalization, technological change and the internationalization of labour markets, is the reform or even a total shift from traditional financing systems. In most cases, however, deficits in the system are compensated or mitigated through ad hoc programmes.

In very few European countries is a clear line drawn between initial and continuing vocational training. In vocational training systems in which systematic vocational qualification is primarily based the free decision of enterprises, financing measures concentrate almost exclusively on the quantitative provision of training for youth. The qualitative requirements are met through normative prescriptions in the training regulations to which trainers are bound because of conventional financing provisions. As quantitative under-provision would imply the danger of long-term social cost burdens through unskilled workers, an attempt is made to remedy the situation through State-financed promotion programmes or a resource collecting system with a more equal distribution of burdens.

Measures for the financing of continuing training concentrate on the promotion of qualifications which can be used on the labour market. If companies do not provide this training themselves, public institutions of the collective-agreement parties take their place by concluding joint agreements.

The financing systems underlying initial and continuing vocational training are not designed to prevent the deficits arising from economic, social and employment-related problem situations. Reality presents a different picture: financing of vocational training is often used as a political weapon against unemployment and as a vehicle to promote economic growth.

4. THE STRUCTURE OF FUNDING SYSTEMS

In funding systems for initial and continuing vocational training the creation, distribution and orientation of financing flows to demanders and providers are regulated through the establishment of organizational mechanisms and use of instruments. In an analysis of the differentiated financing structures emerging from this process, the difference between primary and secondary income distribution can be taken as an analogue. If all financial allocations of the funders are made solely on the basis of the normative order of a financing system, then the ensuing market result is the primary financing structure. As a rule this leaves gaps in the provision of quantitative and qualitative initial and continuing training. Measures taken to re-direct, concentrate or reinforce financing flows to the benefit of target groups, regions or branches have the aim of rectifying the mal-developments which have been caused by market failure. The outcome of this is the secondary financing structure.

These rather theoretical and abstract descriptions will be given a more concrete form in the following by presenting the financing systems and structures in Denmark, Germany, France and the United Kingdom.

4.1 Denmark

4.1.1 Funding of training

In Denmark vocational training is carried out in schools, companies and inter-firm training centres. Their financing is based on a legally prescribed so-called "tripartite" procedure. The choice of the term expresses the fact that the State, employers' organizations and trade unions have reached a mutual agreement through which funding of in-company training is undertaken by distributing the costs between all training and non-training enterprises. In addition to this, public grants are given from the national budget. The compulsory contribution is paid into an Employer-Trainee-Fund(AER) in the form of a fixed amount for each full-time employee, whereby the first and each fiftieth employee and the trainees in a company are not included in the assessment of the amount to be contributed. The AER is jointly administered by the employers and the trade unions. Each year it makes a recommendation on the level of the compulsory contribution which has to be adopted by the Danish Parliament.

The provisions of this regulations were changed several times in the past. At first the companies were only refunded up to 90% of the costs for production-independentphases of instruction in the vocational schools and inter-firm vocational training establishments. Later an additional subsidy, graded according to years of training, was added for each new apprenticeship created in the company. Today this premium is paid for all training contracts concluded since 1992.

Converted into German Marks the compulsory contribution in 1995 amounted to DM 375 per full-time employee per year with the exceptions mentioned above. Together with a State subsidy of some DM 110 million, the total annual volume of the Fund amounts to some DM 400 million a year for about 65,000 trainees. The subsidies for each training contract are fixed at DM 5,000 in the first year of training and DM 4,000 for each further year of the 5-year training period.

Various changes were introduced in the Danish funding system for training in order to react to acute problems arising in the provision of training places for young school-leavers. In the period directly following the introduction of the financing through compulsory contribution regulations, when the only measure was the refund of costs for production-independentperiods of instruction, the number of training places offered declined drastically. For this reason, in 1982, a premium was introduced for companies which maintained or increased their number of training places. The basis for the assessment was a comparison with the two previous years. Following a proposal by the government, the resources required were at first provided by the State and the districts. The subsidy amounted to DM 4,500 for in-company training periods up to 1.5 years and DM 7,500 for longer training periods. From 1984 onwards this premium for re-occupied and additional training places was financed through a higher compulsory contribution from the employers. Two years later these subsidies for re-occupied and additional training places were cut by half and then completely abolished for training contracts concluded after 1988. The result was a dramatic 25% drop in the number of training places offered and a correspondingly lower number of training contracts concluded. A subsequent new change of course in financing policy led once again to a slight rise in the number of training places offered by companies without, however, providing enough places for all applicants.

4.1.2 Funding of continuing training

Continuing vocational training in Denmark is also marked by cooperation between the State and the social partners. This applies both to the orientation of training content and corresponding course design and to the financing of vocational qualification measures for employed and unemployed persons.

At present continuing vocational training is regulated by several laws:

- "Open learning", which offers all adults, including self-employed persons, participation in training parallel to the job, depending on professional experience and mainly in the form of part-time courses. Unemployed persons may avail of these offers free of cost without having to forego the usual unemployment benefits. The law does not give them a legal claim to the financing of course fees, but the State at present assumes about 80% of the course fees (Lecher, 1994).
- Educational leave which was newly regulated in 1993 envisages release from work for the employed up to one year for the purpose of continuing training with continued payment of salary at the level of the unemployment benefit.
- The AMU programme enables further qualification of individuals and the removal of qualification bottlenecks in the enterprise. The scheme is implemented in a network of 24 local adult education centres whose management boards have a equal number of members from the social partners.

Up to 1995 funding of all education and training measures was undertaken from a central labour market fund resourced by tax revenue. Since then the fund is being resourced by a tripartite co-financing system in which the social partners participate. In addition to allocations from the national budget, rising contributions from the workers amounting to 5-8% of their gross remuneration and contributions from the employers starting at 0.19% of the total payroll are paid (Heidemann, 1996).

Throughout the duration of the training scheme the participants receive compensation for loss of salary amounting to the level of unemployment benefit which, in some branches, is raised through provisions in the collective agreements. A collective agreement concluded at national level in 1992 also envisages company agreements on vocational continuing training measures financed by the employers (Heidemann, 1996).

4.2 Germany

4.2.1 Funding of training

The basic structure for funding of training in Germany is a simple one: the training companies assume the costs of their qualification measures for their trainees, the State (i.e. the Federal *Länder*, because of the responsibility for education and culture vested in them by the Constitution) bears the costs of accompanying instruction in the part-time vocational schools. In accordance with the Vocational Training Act (BBiG) of 1969, the companies, when concluding a training contract, commit themselves to paying the trainee a training allowance which is generally fixed in the collective agreement, to "training him themselves or appointing a trainer for this specific purpose" and making training material, in particular tools and materials required for vocational training, available free of charge.

Trends in the funding system of vocational training in Germany in the last 25 years reveal increased State intervention to adjust the primary financing structure, whereby the deficiencies of individual-company financing are masked at the same time. The financing system is complemented by numerous measures at Federal, *Länder* and local level and activities undertaken by the social partners in areas untouched by the State. The outcome of this is a secondary financing structure which is considerably different to the primary structure. The start of active participation in financing by the State was quite clearly determined by the political objective of raising the quality of training and securing it in the long term. The point of departure was the improvement of the vocational education and training infrastructure. The "Programme for the promotion of inter-firm vocational training centres" set up in 1973 envisaged subsidies for 80% of investment costs together with financial participation in running costs. This was at first limited to a certain period, but in the meanwhile it has become a permanent support measure undertaken by the State with a slightly different objective and reduced subsidization rates. The target group is small and medium-sized enterprises, particularly in the crafts sector, and the aim is to assist them to meet higher training requirements arising from technological development through the possibility of providing course-like instruction close to practice. This training is given in training centres co-financed by the public sector and run by economic associations such as the Chambers of Crafts, Industry and Agriculture.

As the number of school-leavers and thus the demand for training underwent a sharp rise in the second half of the 1970s, the focus of State support policy had to concentrate more on the problem of the quantitative provision of training. The title of a programme on the implementation of urgent measures to reduce the employment risks of youth, presented jointly by the Federal Government and the *Länder* in 1977 is guided more by labour market considerations than training policy goals. Since then, at times of quantitative problems on the training place market, which are a permanent feature in East Germany after reunification, a number of financial support programmes have been initiated by the Federal Government, the *Länder* and labour administration (funded from employer and worker contributions to unemployment insurance). All these financial support measures are influenced by social, labour market and vocational training aspects and have the mains objectives of

- ensuring sufficient provision of training places in all regions,
- improving training quality primarily in small and medium-sized enterprises in line with rising requirements (e.g. through inter-firm training centres) and
- facilitating access to training for young persons who otherwise have few chances on the market, such as foreign or disadvantaged German youth, the disabled and the so-called "drop-out apprentices" and young women.

Other forms of non-public inter-company funding are collective agreements in the construction sector, a branch with a notoriously low demand for training places, and Chamber regulations in the crafts sector on the funding of inter-firm training. In both cases these are mechanisms for funding through shared contributions. In the construction sector all companies pay a compulsory contribution calculated on the basis of their gross total payroll into a fund administered jointly by the parties to the collective agreement, similar to the Danish model, in order to finance training processes not linked to a workplace (sectoral fund). In the case of the funding arrangement in the crafts sector, this is also a measure with a qualitative goal. On the basis of a resolution adopted by the General Assemblies of the Chambers, consisting of two-thirds company owners and one-third workers, additional compulsory contributions are paid by all the companies in the territory of the Chamber to finance the costs arising from inter-firm training (regional fund). Both financing models have the aim of bringing about a just distribution of costs between training and non-training enterprises. This is a problem which, with some breaks, has governed the vocational training debate for the last 25 years and has always led to severe controversy between employers and worker organizations. This is a conflict which was legally resolved as early as 1980 at the highest judicial level through the Federal Constitutional Court. At that time however, a law which gave the Government the right to impose a compulsory contribution if too few training places were offered by companies in comparison to training place demand, was declared to be unconstitutional because of a formal flaw in the legislative procedure, but not if there was insufficient provision of training places by the companies. Although resolved in legal terms, the political conflict still continues.

4.2.2 Funding of continuing training

In contrast to the highly formalized structure of initial training, the area of continuing vocational training in Germany does not have clearly defined contours. The number of training regulations for qualification leading to the possibility of a final certificate is considerably smaller. In additional to this, the line of separation to general continuing training is sometimes very indeterminate. There is no consistent overall financing system. Most of the investment in human resources is undertaken by the companies as part of their staff recruitment and development policy. In comparison to initial training where the trainees produce yields through their productive work in the in-company training process and thus make a contribution to financing, the time and money put into continuing vocational training measures is much higher.

The legally based financing share is derived from provisions in the Labour Promotion Act (AFG) and the laws on educational leave in the individual Federal *Länder*. In addition to this, there is a mechanism for funding through shared contributions contained in the collective agreement for the scaffolding sector.

The solidarity contributions from employers and workers envisaged for the continuing training prescribed in the Labour Promotion Act (AFG) is, in the meanwhile, only used for the re-training of unemployed persons, which means a steady reduction of former support for vocational updating and upgrading training. This reduction has not been compensated by the recently adopted Law on Promotion of Upgrading Training (AFBG) either in terms of target group orientation or allocated financial volume and individual support. The persons who can benefit from the provisions in this law are restricted through the link to income limits and a high minimum time volume, and the support consists of 35% outright Federal grants and 65% loans. Furthermore, the maximum duration of the upgrading training measure is fixed. There is no legal claim to support but only the possibility of getting financing resources within the framework of the available budget.

4.3 France

4.3.1 Funding of training

In France training is financed by the companies, the regions and the central State. The share from the companies is contributed in the form of a "taxe d'apprentissage" (training tax) amounting to 0.5% of the gross payroll. In general this tax is imposed on all companies in industry, commerce, crafts and agriculture irrespective of their number of employees or their turnover. This means that, in these sectors, all companies are liable to this tax. The only exceptions from this tax are granted to the central State, the regional and local administrations and their public institutions, the professional associations, the liberal professions and education/training societies. Furthermore, undertakings in the sectors of crafts, industry and commerce are exempted if they employ one or more apprentices and the basis for assessment of the training tax is not more than six times the legal annual minimum wage.

Certain exempting payments may be deducted from the tax due. These are payments made for the mandatory 20% of the contribution which is intended for training alone, that is 0.1% of the training tax. A part of the remuneration paid to trainees (11% of the legal minimum wage per trainee and month) is credited to this. Tax exemptions are also granted for financial support given directly by the companies to the public training centres.

The following payments may be deducted from the remaining tax due according to a special key for different economic branches:

- payments to the training centers, if they exceed the mandatory rate to be paid for training,
- half of the remuneration paid to trainees, including the legally fixed social charges for periods of absence in the training centres,
- the salaries of the persons responsible for practical training in the companies up to a ceiling of one salary for ten trainees,
- payments to public educational establishments or private schools which give initial training,
- the costs of practical training periods in the field of vocational training.

Every company must submit a declaration by April each year to the responsible tax office on the amount of the training tax and the expenditure deducted from this tax. There is an equalization fund for crafts firms and companies with less than 10 workers. As a rule these enterprises have no means of deducting payments from the training tax as their income is too low; they cannot deduct the remuneration they pay their trainees during their period of absence in a public training centre. This fund is administered by an association which has been set up by the assemblies of the Chambers of Commerce and Industry, the Crafts Chambers and the Chambers of Agriculture.

The Fund is also resourced by a part of the training tax paid by tax-liable companies. The amount paid into the Fund may not exceed half the mandatory amount for training. The rate of contribution amounts to 9% of the training tax. With these resources the Fund can pay a fixed compensatory amount to crafts firms or enterprises with 10 or less workers to cover remuneration to trainees during the time they spend in a public training centre.

4.3.2 Funding of continuing training

For the funding of continuing vocational training too, the French State has legal means of obliging companies to participate. If they cannot provide any or only insufficient evidence of in-house continuing training, they have to pay a tax consisting of 1.5% of their gross total payroll or the difference between their own expenditure and the assessment amount. The evidence has to be provided in the form of a company training plan. In detail this means that enterprises in small industry and commerce with more than 10 employees have to allocate 0.9% of their gross total payroll for measures in the area of in-company training, 0.2% for individual educational leave and 0.4% for the integration of new entrants to employment. An overall quota of 0.15% applies for small enterprises with less than 10 workers. These legal obligations are mostly fulfilled via Funds set up through the collective agreements. These stipulations apply in general for educational leave, they apply to a great extent for measures integrating new entrants to employment, and only apply in some economic sectors for continuing training within the framework of the company training plan. These Funds are organized at regional or sectoral level; the resources collected in them are used for the funding of educational measures. In this area the parties to the collective agreement are not strictly bound to a legal procedure.

Even when the Funds are set up on the basis of collective agreements, this does not always mean that they are administered jointly by the parties. In the large metalworking, chemical and banking sectors there have, up to now, only been Funds which are administered by the employers alone. They organize the collection and use of the resources, their structure is regional, supra-sectoral and sectoral. They are all united under the umbrella of the *Organisme Paritaire Collecteur Agrée* (OPCA).

The legal quota gives a clear priority to continuing training measures contained in the company training plan with the use of internal or external continuing training schemes and thus clearly stimulates the own interest of the companies in bringing about a better qualification of their employees. The complement to the measures organized on the basis of the company training plan is individual educational leave, which as a rule is financed by the Funds established at regional level, in particular for workers with low qualifications who may apply for this leave. In the case of updating training, the participants get 80% of their wages. Wage subsidies of 90% are paid for re-training courses leading to a certificate of qualification. The rate at which the Fund finances the costs of the training schemes is not uniform, but amounts on an average to about 95% of the total costs.

In addition to the funding provided by companies, the State also participates in the costs of training for young unemployed and other disadvantaged persons by giving subsidies amounting to about DM 6 billion.

Since 1988 companies are given tax relief when their training expenditure exceeds the minimum quota fixed by law. In this case, a tax voucher amounting to 25% is given for additional expenditure up to an amount of DM 350.000 above the compulsory amount fixed by law. The voucher is raised to 40% of additional expenditure if training measures for unskilled or low-skilled persons and employees over 45 years of age are financed by companies with less than 50 workers (Lecher, 1994).

4.4 United Kingdom

In the United Kingdom non-school vocational qualification processes for which there is no binding regulatory framework, are mostly funded by employers. The share of public and individual contributions is relatively low. Content-wise there is no differentiation between initial and continuing vocational training. Training is given, if at all, for age groups of 16 to 17 year-old school-leavers and 18 to 59 year-old workers.

Systematic financing is available only for certificates which can be acquired on the basis of the qualification standards "*National Vocational Qualification* (NVQ)" and "*Modern Apprenticeship*" recommended by the government.

The government provides a considerable volume of funds for training measures which lead to these certificates. They are administered by a network of 82 semi-public "Training and Enterprise Councils (TECs)". To this end the Employment Department of the British Ministry of Labour concludes contracts on the administration and distribution of these funds which vary annually between UKL 15 and 50 million depending on the TEC. The TECs sign contracts with private training providers which include companies, so that certificates for a specific level of qualification can be acquired through training schemes in the support programme "*Youth Credit* (YC)", formerly "*Youth Training* (YT)" for 16 and 17 year-old school-leavers, and "*Training For Work* (TFW)" for 18 to 59 year-old persons who have been unemployed for more than 6 months. The objective of YC is to enable young persons to acquire vocational qualifications at least at NVQ Level II, while the aim of TFW is the reintegration of the long-term unemployed in the employment system through enhanced qualifications. In the YC scheme every school-leaver is given a voucher which he can present to any accredited training provider of his choice.

In 1993/94 the TECs received public funds amounting to UKL 2.4 billion. 80% of this, i.e. UKL 1.8 billion were spent on YC or TFW schemes. The remaining funds are available for two other support programmes (Education Initials and Business and Enterprise Support) and for administrative costs. The different types of support schemes are strictly separated in the budget. Thus, transfer of funds between the four training schemes is only permitted up to a level of ± 5% of the individual budget items. Transfers above and beyond this require the consent of the government (Felstead, 1994).

The TEC management boards have an average of 15 directors. At least two-thirds of them must be top managers in large local undertakings. The other directors have to be leading representatives of economic or education sectors or come from trade unions, welfare associations or the public sector. Because of this, large industry is over-represented in the boards where the production and services sectors predominate (Felstead, 1994).

5. REGULATORY AND FUNDING PROCEDURES – CONVERGENCE AND DIVERGENCE

The convergent and divergent features emerging from the description of individual national financing systems can be broken down into different categories for the purpose of a comparative analysis. However, given the problems of method and data described above, this method is not to be recommended because the risk of misconceptions and mal-interpretations cannot be excluded.

5.1 The State as regulator and funder

An approach limited to the role of the State as funder and regulator of financing in the four systems presented as examples, leads to the following result: in Denmark and France the financial participation of companies – in some cases with consideration of their size – in the funding of vocational training is regulated by law irrespective of whether they actively participate in the financing process. In France compulsory participation, which entails payment of a tax in the case of non-compliance, covers the whole range of initial and continuing vocational training. In Denmark the compulsory contribution fixed by law for all companies only covers the field of initial training, and it flows back to the training companies via a Fund to re-finance their costs arising from workplace-unrelated training phases. For continuing vocational training a system of financial participation through employer and employee contributions is being developed.

In Germany and the United Kingdom there are no legal obligations for companies with a passive attitude to training, to participate in the financing of initial and continuing vocational training. Only with a very broad scope of interpretation can the legal provision in Germany on the use of resources collected through employer and worker contributions to the solidarity fund for the financing of the out-of-company training of disadvantaged youth and unemployed persons, be taken as indirect participation in costs.

The assumption of costs by the State in the form of direct and indirect participation in financing occurs with varying intensity in the four national systems described. The most extensive contribution is made by the State in the United Kingdom through its financing of the NVQ and FTW systems, if the considerable level of State expenditure on the expansion and maintenance of educational establishments and schools in Denmark, Germany and France is left out of consideration. In Denmark the volume of State co-funding of in-company initial training amounts to about one-fourth of the financing undertaken collectively through compulsory contributions, whereas in the field of continuing vocational training it (still?) predominates.

In Germany, because of the economic order, there is restraint at Federal level to directly co-finance in-company training activities through open subsidies or grants to undertakings. However, this principle has repeatedly been disregarded, particularly because of the continuing difficulties in the quantitative provision of training in the East German *Länder*, through premiums for each concluded training contract and the financing of Community initiative programmes with the participation of the Federal *Länder* and the EU to implement out-of-company training as a substitute for in-company training. The Federal *Länder* do not practise this restraint implicit in the economic order. They finance a number of target-group-oriented and/or scheme-oriented programmes – also for companies - in order to alleviate acute emergency situations. Permanent financial support measures at the Federal level are confined to inter-firm training as a supplement to in-company training, subsidized upgrading training and low-interest loans, and the promotion of talented persons through premiums for trainees who have completed their training with outstanding success.

In France the State finances training schemes for problem groups on the labour market from tax income and rewards companies which are particularly active in training through tax premiums. The resultant tax losses add up to a not inconsiderable volume of State financing if one recalls that in 1994 the French enterprises spent 3.3% of their total gross payroll on continuing vocational training, i.e. more than double their legal obligation (Jeger, 1997).

5.2 In-company financing via collective agreements

The participation of the social partners in the organization of initial and continuing vocational training is particularly conspicuous in Denmark because of national, regional and collective agreements on the reduction of remaining individual financing amounts. In Germany this is more or less restricted to the construction sector.. In the last few years however, in the course of wage/salary collective agreement negotiations leading to a reduction or a freeze of trainee allowances and a renunciation of other general income claims by the trade unions, the employers have accepted a commitment to increase their initial and continuing vocational training efforts. A result which, as a consequence, means a partial rise in individual financing by foregoing material improvements.

In France the participation of employer and employee organizations is mainly characterized by the distribution of resources from the regional and/or sectoral Funds set up through the collective agreements. In the United Kingdom where, like Germany, funding of vocational training is mainly undertaken by the individual company -without, however, any prescribed, systematically regulated training courses -, the influence of the trade unions is absent after it was deliberately trimmed down in a political process.

5.3 Individual funding

In all four countries the financing contributions made directly by training participants does not reach a figure worth mentioning. If a person participates in training schemes which are not financially supported, the fees to be paid can be compensated in part - only in the United Kingdom and Germany - through tax deductions. This means some co-financing by the State in these cases.

6. OPERATIONAL FEATURES OF FUNDING INSTRUMENTS AND REGULATIONS

6.1 Typology of funding systems

This description of the systems for financing vocational education and training in Denmark, Germany, France and the United Kingdom tried to show that several financing mechanists are combined or applied side by side in these systems. If they are summarized according to the dominant aspects underlying the order of the system, three system-determinant characteristics may be identified (Sellin, 1995):

- The liberal system in the United Kingdom where the companies essentially have the liberty of establishing the quantity and quality of initial and continuing vocational training themselves and where the State only prescribes levels of graduated qualification standards without, however,,regulating the paths to be followed for certification.
- The neo-cooperative model, e.g. in Denmark, where employers' associations and trade unions actively steer the process of financial organization and where the State confines itself to putting a legal stamp on group consensus.
- The interventionist mode where the State, as leading actor, assumes the role of designing the system in collaboration with the social partners. This example is to be found in France.

It may be noted that the German financing system has not been classified in any category. In their contribution to this report Koch/Reuling have, very rightly, identified the German dual training system "as the case of a corporatist company-based training system". The reason why Sellin does not classify the German financing system in any given order underlines the fact that the organizational principle of the overall vocational education and training system is not unconditionally reflected in the financing mechanisms. Indeed, the German vocational training system is an example of a system where a training system directed by group consensus in terms of content and final certification, tends to follow liberal principles in its financing arrangements.

Corporatist element – as seen - are not foreign to the German financing system. Apart from the collective agreements mentioned above, they also include Chamber regulations on compulsory contributions to share the costs of inter-firm training, a provision which Administrative Courts, in several rulings, have stated is in conformity with the system. Several complaints lodged by companies against this form of financing led to these decisions.

6.2 Inter-firm versus single-company funding

6.2.1 Transfer of models to Germany?

Triggered by the growing deficits in the provision of company training places as the result of economic recession together with the demographically generated rise in training place demand, the discussion on a reform of the financing system for training which has repeatedly taken place from the beginning of the 1970s, has erupted once again between trade unions and employers. In the opinion of the trade unions, single-company financing of training must be replaced by inter-firm financing which, as in Denmark and France, will compel companies which do not train or train too little to participate in the costs of training. As the Danish and the French financing models play a considerable role in this discussion, a brief examination of the possibility of transferring financing elements from both systems to Germany will follow.

6.2.2 From Denmark?

The Danish vocational training system is organized on a dual basis like the German system, that is, the training processes take place alternately at different venues, namely, the company, the school and inter-firm vocational training centres. The compulsory contribution to training to be paid by each enterprise is a fixed sum set up without any differentiation. The subsidy flowing back from the Fund is the same for every concluded training contract, it is reduced after the first year of training and then remains constant up to the end of the training period. This type of contribution means a more of a disadvantage for employment-intensive companies vis-à-vis capital-intensive companies than a contribution based on a percentage of the gross total payroll of the company, because the latter differentiates according to the wage and salary structure of the undertaking. The reduced level of subsidy after the first year of training is, at most, weak evidence of a cost-oriented provision of funds. It takes marginal account of the fact that the trainees generate earnings during the in-company part of training, but takes no account of the level of remuneration for trainees or the input-return ratio which fluctuates from occupation to occupation.

6.2.3 From France?

The French training tax is the manifestation of State-dominated steering of the training system. This tax, which has the aim of stimulating company commitment to "*formation d'alternance*" (alternance training), can be avoided by crediting company training activities. This regulation has been taken on board by the advocates of compulsory company contributions in three bills presented to the German Parliament for discussion and adoption. The opponents of compulsory contributions, on the other hand, reply that this solution would have a negative effect on the training behaviour of companies. Enterprises could – they argue – use the possibility of buying release from this levy or reduce their training efforts if they already lie above the mandatory level stipulated for the tax. This criticism is unjustified, as empirically substantiated findings on the continuing training tax in France show. The contradiction between speculation and reality unveiled here is a striking illustration of the political dimension of the German financing debate in which even the advocates of a compulsory contribution regulation are reluctant to include objective facts in their arguments.

6.2.4 Political and systemic obstacles

In the course of a recently concluded research project conducted by the Federal Institute for Vocational Training, a survey of large firms in Germany showed that training-related cost considerations only affect company decision to a limited extent. For German undertakings training is the most important instrument in their staff recruitment policy. The decisive factor is the forecasts of future employment opportunities in the company concerned. An assessment of actual patterns of behaviour does not however permit the conclusion that the arguments of the protagonists and the antagonists result in mutual neutralization. Despite this, it is striking that Danish employers are ready to accept regulations which their German colleagues are prepared to reject with all consequences.

Another important factor for consideration is that the provision of training places in Denmark shows an annual deficit - measured against demand - of up to 15%. The success of a transfer of financing mechanisms from other countries depends primarily on the status attached to vocational training. Furthermore, in Denmark and even more in France, the company training ratio (trainee/worker ratio) is relatively low compared to Germany (6% to 2.5%). The stimulating effect of a financing system organized on a collective, inter-firm basis should, in the case of low company training output, be assessed positively, even though this thesis cannot be verified through French experience. In any case, with regard to Germany, some scepticism is justified - apart from the political resistance - because here a comprehensive training system already covers all areas of employment and the majority of training places are offered here without financial incentives because of traditional patterns of behaviour or because of the expected benefits from training, and thus there is only limited scope for other mobilization opportunities.

6.3 Incentives to improve the quality and quantity of vocational education and training

6.3.1 Tax incentives

A conspicuous feature emerging from a study of the financing structures of selected European countries is that, with the exception of the above-mentioned tax voucher for companies which are over-proportionately active in the field of training, fiscal policy measures to benefit vocational education and training are not used by the State as an incentive to improve, secure and raise the quality and quantity of training. At least, references to such incentives are not to be found in the available literature on financing.

This is no reason to abstain from an abstract examination of possible measures in this policy field, because the EU Commission addresses such activities under the heading "Treat capital investment and investment in training on an equal basis" in the fifth general objective in its White Paper on education and training "Teaching and Learning – Towards the Learning Society" (European Commission, 1995). The aim of this postulate is to take account of the fact that company expenditure on training is equivalent to investment in human capital and should be treated in the same way as investment in capital goods. This proposal should be welcomed unconditionally in the interest of a political upgrading of vocational training.. However, under German tax laws, its implementation would have a counter-productive effect. In Germany the costs of vocational training incurred by the enterprise can already be deducted from profits. This proposal would mean that the present one-time write-off of investment in human capital would be replaced by a distribution over several years pro rata temporis which would mean a deterioration of the balance sheet figures and a lower profit quota in the profit and loss account of the company.

From the German angle, the most effective, just and transparent form of all possible tax concessions is the tax voucher given to companies in France which spend an over-proportionate amount on initial and continuing vocational training. The same monetary effect can be achieved with another instrument which has a different fiscal structure, namely, the deduction of a fixed sum from the tax liability (e.g. for making additional training places available). In the context of German fiscal law, the following relief measures for company expenditure on vocational training are also conceivable in principle:

- Special or immediate write-off of depreciable goods in the company assets which are used first and foremost for vocational training.
- One-time reserves for the net costs of vocational training at the point in time when the training contracts are concluded and dissolution of the reserves when the training is finished.
- Reserve or allowance systems which are linked to the number of training places offered.

However, the following problems arise when these instruments are used:

- The immediate relief effect depends on the profit situation and the legal form of the company (both determine the taxation rate).
- All the measures mentioned above, with the exception of the tax voucher or deduction from the tax liability, only bring about a deferment of tax payments, the actual relief only takes the form of lower interest burdens.
- Large companies are favoured by a progressive tax rate which also means progressive relief, and are thus favoured in comparison to small and medium-sized enterprises.

Tax concessions for company and individual financing of training raise the State's share in the overall training budget and thus lead to a, at least short-term, reduction of tax revenue. However, in the long term there is a chance of compensation through higher tax revenue later when higher-qualified activities lead to higher salaries in the employment system.

If the financing structure of a country is not to be fundamentally modified, tax relief measures with an incentive function to encourage more initial and continuing vocational training should remain restricted. The French practice of giving a tax voucher can be taken as an exemplary model here.

6.3.2 Training vouchers

In Germany the problems of financing are always viewed unilaterally in terms of training provision even though, a few years ago, the German training place market was affected by a rather long period of low demand. In order to overcome this a whole range of measures and instruments were categorized, but not financing. However, financing is a steering element which, if necessary, can stimulate both supply and demand. One incentive on the demand side is a training voucher as a guarantee that training costs for youth and adults will be assumed by public or private institutions. In the case of supply deficits however, their effect is similar to that of fully financed support programmes. The level of demand could be maintained if the vouchers only implied a guarantee to assume a part of the costs and the demanders of training would be prepared to pay the remaining costs themselves. Given the short resources for support, it would even be possible to raise the number of persons assisted. However, the risk of a declining interest in training would continue to exist latently and the danger of future gaps in qualification would grow. This financial solution would imply a trend towards privatization of initial and continuing vocational training which would, first and foremost, hit persons disadvantaged on the market with all the negative consequences. The switch from the YT to the YC in the United Kingdom was undertaken with the aim of strengthening the position of youth as demanders and thus possibly re-orienting the programmes administered by the TECs. However, the chances of success must be assessed with some scepticism as long as the contractual bases between the Government and the TECs are not revised (Felstead, 1994).

6.4 Evaluation approaches

In times of crisis-laden economic, labour-market and socio-political developments, the pressure of high expectations weighs heavily on vocational education and training. Everywhere it is virtually considered to be a general panacea to remedy a vast range of social problems. Special attention is directed to the financing system. It is expected to bring a provision of training places with qualitative and quantitative choices. In addition, it is expected to provide access to good vocational qualifications which can be put to effective use on the labour market, and finally it is expected to reduce distortion of competition between undertakings of different sizes and between sectors and regions (Sellin, 1995).

At present all these goals cannot be considered as fulfilled, either individually or collectively. In this context the question arises whether this situation is mainly due to the use of inadequate financing instruments, or whether it is not the manifestation of an inherent conceptual or organizational weakness of the entire vocational qualification system; because, before taking a decision on how to fund measures it is necessary to answer the question of what should be financed to what extent and from which resources.

Starting from the vocational education policy goal of bringing about a provision of training places with qualitative and quantitative choices, the first step in an evaluation - restricted to the quantitative effect - of individual financing procedures would be to establish to what extent they mobilize a financing volume which can meet demand. A comparison with alternative mechanisms in other countries is to be rejected because of different constituent foundations. An effective comparison can only take place when modifications in financing occur in the national context. But the fact that reliable findings on higher or lower levels of efficiency cannot be obtained even in this case, will be illustrated through two examples from Germany.

6.4.1 Germany

From 1976 – 1980 there was a legal regulation on compulsory contributions from companies which enabled the Government to impose a levy in the case of a quantitative shortfall of training place supply. Despite the fact that this situation did arise, the regulation was not enforced. The continuous rise in company training place provision during this period came to a stop after the law was declared to be unconstitutional. Up top now, there has been no scientific research in Germany which tries to establish a causal connection between this threat of a compulsory contribution and the growth in company training place provision. However, the then Government and the political parties it was composed of repeatedly stated that the effect of this regulation was “fleet in being” or equivalent to that of the “sword of Damocles”.

Since the mid-1970s the construction sector has a regulation on compulsory contributions from companies, stipulated in the collective agreements, which in periods of high training place demand led to a large number of training contracts being concluded; however, during the decline in demand in the mid-1980s, this figure dropped by 40%.

Evaluation attempts to determine the ratio between the costs and the quality of vocational training are much more complicated. In 1974 an Expert Commission set up by the Federal German Parliament developed a method to measure the input and output quality of the German training system with the aid of indices. The input quality factors they defined were organization, technology, intensity, staff and training method. Output qualification was sub-divided into 4 competence criteria to be acquired by the end of training: formal, occupational, work-environmental and social competence. The question whether financing mechanisms can be successfully evaluated with the use of this method approach has not been investigated up to now.

6.4.2 United Kingdom

In the United Kingdom the financial administration of the TECs has been critically examined (Felstead, 1994). The allocation of public funds is undertaken on the basis of a point system differentiated according to seven criteria. In the YC the costs of the different NVQ levels include the number of NVQs acquired per 100 course-completing persons and the number of young persons who wait 8 weeks or longer for a YC place. In the case of TFW the costs are also taken and the number of NVQs acquired per 100 course-completing persons plus the number of successful transitions to employment or other full-time training schemes, also per 100 leavers. The survey reached the conclusion that this evaluation system prevents financial incentives to support cost-intensive and high-quality training measures and instead only promotes the cheapest, the easiest and fastest training courses. This means that the conditions on financing laid down by the Government for allocation of funds with the aim of obtaining better and more efficient returns on training, practically achieve the opposite.

6.4.3 France

In France a survey conducted by the National Statistical Office (INSEE) showed that 25% of interviewed workers participated in continuing training schemes from 1989 to 1993, whereas from 1973 to 1977, i.e. shortly after the introduction of the mandatory minimum obligation to finance continuing training, the figure was only 11% (Goux/Maurin, 1997). The same survey reveals that the later income of persons participating in continuing training schemes was 2.5 % higher.

7. FINANCING AND HUMAN RESOURCE ACCOUNTING

The financing of the costs of initial and continuing vocational training should be viewed as an investment with anticipated returns. Despite this, vocational qualification is far from being conceived as an integral part of a consistent investment concept. This is mainly due to the three following reasons:

- In Germany at least, human resources are intangible goods and cannot be entered in trade and tax balance sheets.
- It is difficult to assess and quantify education as an investment input.
- Training measures face the dilemma of an asymmetrical situation: Expenditure and costs arise in the short term; but income, output and returns, are only obtained in the long term. There can be no direct allocation of input to the success of the company.

The basic idea of accounting human capital which is also discussed in the White Paper of the European Commission, is that vocational training gives the individual a portfolio of knowledge and skills which is used up gradually through his work. In principle, this idea is not very different to the accounting of material resources. In the balance sheet the available assets at the beginning of the year are entered at their replacement value. From this, the depreciable assets are deducted and current investment is added. At the end of the year one obtains the final level of assets which again is the starting level for the next year.

Vocational training measures can also be assessed at their replacement cost. The problem here is how to handle the depreciation instrument. In contrast to machines and buildings, acquired knowledge potential is not "worn out" through use. The corresponding process in the field of education and training is the gradual change in skill requirements which are transformed through the purchase of new machines, the use of new materials, the development and introduction of new products and new forms of work organization. The outcome is a creeping loss of competence, i.e. the necessity of depreciating human capital arises from the outdating of knowledge and continuing training is the instrument used to remedy this process.. The financing of continuing training costs is thus analogous to re-investment to offset depreciation in the capital goods sector.

For human resource accounting it is important to have knowledge of the financing network of funders with all their financial outflows. The following diagramme presents a financial account of initial and continuing vocational training.

In Germany the Federal Statistical Office collects data on all private and public training expenditure (for the time being without the expenditure on in-company continuing training).

The point of departure is the OECD statistics in "Education at a Glance". The figures, following the table below, will also include an account of inflows and outflows differentiated according to funding and receiving sectors.

This is an important step towards a national accounting of human capital based on costs or expenditure.

Table:

Outline of a financial account of investment in vocational education and training

Recipient / Funders (Type of cost)	Dual system		Vocat. school³	College / Univ.	Continuing training funders			Chambers (Education administr.)	Private persons (subsistence, training allowance, continued payment of wage/salary)	Total
	Part-time vocat. school	Venue firm/ inter-firm			Private and public funders	Churches, associations and trade unions	Firms			
State • Expenditure on infrastructure - Personnel costs - Material costs - Material investm. • Trainee allowances • Continued payment of wages and salaries • Other expenditure (e.g. BAFöG, research promotion)	▨	▨	▨	▨	▨	▨	▨		▨	
Federal Labour Office • Institutional support • Subsistence • Other expenditure		▨			▨	▨	▨		▨	
Companies¹ • Expenditure on infrastructure - Personnel costs - Material costs - Material investment • Trainee allowances² • Research promotion • Other (Chambers)		▨			▨	▨	▨	▨	▨	
Private households • Subsistence • Material costs					▨	▨	▨		▨	
Total										

Grey areas = with financing flows; white areas = without financing flows

[1] Including churches, associations, trade unions (organizations without gainful activities)
[2] Including continued payment of wages and salaries
[3] Including technical schools

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DEMOGRAPHY, LABOUR AND TRAINING: STATE OF RESEARCH AND EUROPEAN DEVELOPMENTS

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1. SUMMARY

1.1 Demographic developments and labour force potential

„Ageing" is the term used to describe changes in the structure of the population which involve a growing proportion of older and a shrinking proportion of younger people. This process is currently shaping the demographic development of almost all Member States in the European Union and will continue to do so in the future. It has been triggered by the low birth rates over several decades and constantly higher life expectations.

The absolute parameter of labour force potential made up of people aged between 20 and 59 will scarcely change at all in most Member States of the European Union between 1995 and 2010. The exceptions are Spain and France where the labour force potential is likely to increase considerably or in the case of Italy to fall. The almost unchanged labour force potential is set against a growing number of individuals over the age of 59. People from the baby boom years are reaching the age of retirement and the arithmetic relation of the older to the 20 to 59 year olds will continually rise up to the fourth decade in the next century. For each person of working age today in the European Union there are 0.37 over 59 year olds. The situation is "more favourable" in the "younger" populations in Ireland (0.3), the Netherlands and Finland, "less favourable" in Sweden (0.41), Greece and Italy. Germany with a figure of 0.36 is close to the average. Up to the year 2010 this ratio for the EU as a whole and for Germany will increase to 0.44. Ireland, Luxembourg, the Netherlands and Portugal will probably remain far below this. The ratios in Italy and Sweden are well above average.

In populations with the classical pyramid structure, the older age groups are larger than the younger ones. In industrialised countries this situation has been reversed. The next 15 years will mark a historical turning point: the labour force potential in EU Member States - (still) with the exception of Portugal and Greece - will contain more older than younger people. On average the proportion of 40 to 59 year olds to the 20 to 39 year olds will increase from 0.82 to 1.12. The increase will be particularly high in Germany, Luxembourg, the Netherlands, Austria and Finland.

1.2 Quantitative and qualitative links between demography and vocational training

There are both quantitative and qualitative links between demography and vocational training. On the one hand, demographic developments affect the number of pupils in the corresponding educational institutions. Of course, this is also influenced by education policy, the labour market, education wishes and educational science. In recent decades this "social component" has led to greater demand amongst young people for training than might have been expected in demographic terms. Forecasts about future numbers of pupils cannot, therefore, be based only on scenarios about population developments. They must also make assumptions about the future social components.

By means of the labour market demographic developments also affect training in qualitative terms. When the population shrinks and its average age increases, this is bound to have an effect on the labour market which, in turn, will lead to changes in training structures and contents.

The theory of the links between the population and the prosperity of a country was and is determined by the employment situation of a growing population. What is less spectacular is the discussion from the angle of demographic economics about the economic development of dwindling or stagnant populations, i.e. western Europe's likely future. Viewed optimistically it is not to be expected that the innovation capacity of "ageing" western Europe will decline given its economic interaction and rapid dissemination of innovations. In pessimistic terms the employment problems are growing, family structures are changing and populations are stagnant or shrinking further.

In terms of use of the national product, the question is whether the performance of the working population will suffice in order to cover the needs of those groups in the population which are growing in size but which are not yet or no longer in employment. In the case of the same or even dwindling labour force potential, which seems a likely scenario, further work saving technical progress and/or increased work involvement will be necessary. The formal qualifications of the labour force must even be increased in a disproportionate manner. The past does, however, show that in the long term productivity obviously cannot rise more quickly than economic growth (and by extension than the national product). Hence, it is unlikely that there will be a situation of constant growth in the national product by compensating for the smaller working population by means of independent control of the growth rate of productivity.

Qualitative estimates are also linked to forecasts about quantitative needs for labour. Demands for a higher and different level of qualification have been prompted by requirements on the labour market on the one hand and the need to secure employment on the other. The basic idea behind the demands for a different type of qualification is that "key qualifications" are thought to be more of a guarantee for the future than qualifications which are too closely tailored to occupational activities although these are not to be neglected either.

Demands for a higher qualification of the workforce can refer to analyses of workplace requirements so far. In the future it is expected that sectoral changes and the growing importance of qualified service tasks in the world of work, the spread of new technologies, the growing complexity and differentiation in economic and social activities as well as the internationalisation of markets will bring with them a clear rise in qualification requirements in jobs. The number of workplaces for the unskilled could fall in both absolute and relative terms, the demand for highly qualified employees who undergo further training is likely to increase considerably.

This demand for higher qualification is also based on past experience indicating that the risk of unemployment was lower when there was a higher level of general and vocational training. In OECD Member States at the beginning of the 1990s unemployment amongst the unskilled or semi-skilled was above average. However, there are major differences from country to country and broad training does not automatically offer protection against unemployment.

It should be mentioned in passing that it is not just demographic developments which affect the labour market and vocational training. Education also influences the demographic behaviour of people. This influence can be presented by the media as affecting the behaviour of the labour force in connection with the birth rate.

1.3 Consequences of demographic developments

Earlier expectations that the labour market problems of young people in the weaker cohorts would be reduced have not been met in most western European countries. Nevertheless, the quantitative effects of demographic developments continue to be important for the labour market and education. Secondly, the structure of the population has changed as a consequence of the influx of people into Europe. There are other demographic factors which influence developments on the labour market and which should be mentioned briefly here such as the increasing employment of women and the extended school and training times. Finally, it should be pointed out that people in employment today retire earlier than was the case of previous generations - a phenomenon which itself is of course also influenced by the labour market.

In the next ten years the young age groups entering the labour market will remain more or less the same, those which follow will, however, be smaller. One dilemma in forecasts today is to get people to understand that the relatively tight labour market situation will soon be followed by a period in which the supply of jobs will exceed demand.

The European Union is increasingly assuming the task of shaping initial vocational training in its Member States. Of course, attention is also focusing on the demands of the future. So far, however, no mention has been made of the importance of demographic developments. This situation is quite different in the case of continuing training. In one area of research which is rapidly attracting attention, changes in continuing training are being explained by increased ageing and future shrinking of the labour force. Concrete steps are also being taken to prepare for these changes. One aspect of demographic ageing is the shift in the average age of the labour force potential or labour force. In this context it is normally assumed that older employees have a lower level of qualification because of the risk of „dequalification" and the company-specific narrow nature of the qualifications. Furthermore, differences in inter-generational qualification levels have a negative effect and there is an age-related change in performance. Continuing training must take these phenomena into account and develop in line with them.

Changed demands are also being made of vocational training because of the growing ethnic heterogeneity of young people. So far the involvement of foreign young people in education has constantly been lower than that of children of parents born in the country. The differences in performance in school-leaving examinations are even more obvious in vocational training. The causes for this different level of involvement in education are to be found in the demand for education by foreigners, school programmes and in the behaviour of employers.

1.4 Research tasks

Given the doubts about the pedagogical and/or economic reasons for educational planning, it is scarcely surprising that so far little consideration has been given to demographic aspects.

It is quite obvious that the most important contribution of demography to vocational training is to determine and also predict the size of the relevant population groups. Furthermore, demography must provide information about the structure of people interested in undergoing education and training. Identification of the learning preconditions can be viewed as a joint task for educational science and demography.

Demography is itself interested in analysing which population-related, political ideas determine the contents for example of language instruction and political instruction and what demographic contents are taught in schools.

One broad field in this connection is the examination of the further career paths of people who have completed the education system. This involves both quantitative and qualitative links between education and employment, social background and later social position, cohorts and cyclic effects on the course of people's lives.

2. INTRODUCTION

The imminent changes in the structure of the population will be one of the most difficult problems facing Europe in the future. The proportion of older people is on the increase, that of young people is decreasing. This is caused by the low birth rates over several decades and constantly rising life expectations. Increasing demands are being placed on people of working age to support the up-and-coming generation of children and young people as well as older generations.

This development which is described as "ageing" becomes obvious not only when we look at the population as a whole but also at the labour force potential and at the age groups of working age. In most Member States of the European Union, the younger age groups which enter the labour market in the next decades will be smaller than the older age groups who retire. And in company workforces the older age groups will be larger than the younger ones. One positive feature is that the older people have more skills and greater experience. They also save more from their higher income and pay more tax. However, it will be difficult for them to keep pace with the rapid changes in occupational requirements and qualifications.

Finally, the ethnic composition of the population of working age may shift further towards greater diversity because of the major influx over the last few years. Immigration from countries outside the European Union is likely to fall in the next few years but will not come to a complete halt. The immigrants themselves and their children also bring about changes in the demands on the labour market and in the educational system.

Given that the future demographic problems of vocational training are blatantly obvious, it is very surprising how little research has been done on the subject. This may be attributable, amongst other things, to the general lack of information about vocational training.

"In Europe today you can get more information when it comes to choosing a hotel or restaurant than you can when choose training," observed the European Commission in 1995 somewhat ironically in its White Paper on General and Vocational Training (European Commission, 1995, 35). Similar reasons were given in 1997 in the Federal Republic of Germany to explain why trade unions and industry reached an agreement on vocational training, "further training schemes and further training regulations are popping up all over the place, we have completely lost count." ("Gewerkschaftliche Bildungspolitik" [Trade Union Educational Policy], 1997).

It was very difficult to collect and evaluate the information presented here on the links between demography and vocational training not because of the volume but because of the meager nature of that information. For that reason this expert report can claim to be entering new territory.

2.1 Quantitative and qualitative links between demography and vocational training

There are both quantitative and qualitative links between demography and vocational training. On the one hand, demographic developments affect the number of pupils in the corresponding educational institutions. Of course, this is also influenced by education policy, the labour market, education wishes and educational science. In recent decades this "social component" has led to greater demand amongst young people for training than might have been expected in demographic terms (cf. Tessaring et al. 1990). Forecasts about future numbers of pupils cannot, therefore, be based only on scenarios about population developments. They must also make assumptions about the future social components. Any discussions in that respect will be difficult within the framework of this paper, in particular when considering the European Union as a whole.

By means of the labour market demographic developments also affect training in qualitative terms. When the population shrinks and its average age increases, this is bound to have an effect on the labour market which, in turn, will lead to changes in training structures and contents.

2.2 Overview of contents

Now that the scope of the study has been outlined, the theoretical framework will be described in which national populations in terms of size and structure will be related to national income. The latter is a product of the labour volume and the respective labour productivity and also of the training of the working population. A sub-section addresses the influence of education on demographic behaviour. The description of the effects of previous and, more particularly, of the likely further demographic developments on initial and continuing vocational training is then given. This is broken down into the phenomena of the current, still relatively large age groups, the imminent shrinking, the onset of the ageing of the labour force potential and increasing ethnic plurality. Research in the field of continuing training in particular can be used to formulate guidelines for the analysis and planning of initial training in the future against the backdrop of a shrinking and ageing labour force potential. Finally, the results of forecasts of population size will be given for the European Union, especially for the age groups of working age.

3. THEORETICAL FRAMEWORK

This chapter addresses the links between demographic development and the productivity factor, labour. It then examines qualification needs and finally gives a brief description of the effects of training on demographic developments. The main focus is on theoretical findings. This breakdown already reveals one thing: in western industrial countries there is no explicit effect of demographic development on educational contents. At the very most this influence could be observed perhaps in shifts in the level of education and participation in education in a population, for instance by migration. Via the medium of economic development, there are, as a consequence of demographic changes (growth, shrinkage, ageing, ethnic heterogeneity), changes in qualification requirements. It should be stressed that this report focuses almost exclusively on instrumental education which can be used on the labour market. No consideration is given to the contents of any other form of education.

3.1 Demographic development and the production factor, labour

The theory of the links between the population and the prosperity of a country was and is shaped by the employment situation of a growing population. The starting point was Malthus' conviction that populations grow more quickly than the resources they require and that for that reason demographic policy and a new ethic are necessary. Ester Boserup (1965) developed the theory that - unlike Malthus - a growing population leads to greater work intensity. In fact both theories at first glance seem credible if we base them on different innovations and the technology of agriculture which is the most important factor for nutrition: an innovation of the Malthusian type immediately follows on from growth in the population which "gobbles up" the yield whereas for Boserup a more intensive technology will typically be used when the demographic pressure is so great that this becomes worthwhile (Simon 1993, Felderer/Sauga 1988, Kelley 1993).

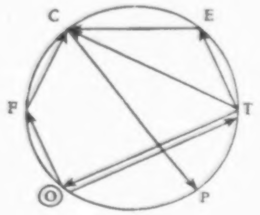
What is less spectacular is the discussion from the angle of demographic economics about the economic development of dwindling or stagnant populations, western Europe's likely future. A distinction should be made between thoughts about creation and use of the national product.

In his standard work (1983), Felderer points out that the availability of innovation, which has a major effect on productivity, does not depend on the respective demographic development of individual countries. The economic links and improved communication between industrial countries bring about the rapid distribution of innovations irrespective of where they are developed. It is only when the population starts to shrink in all industrialised countries that we can expect a corresponding drop in the development of technical knowledge (Felderer 1983).

Only recently Boserup contradicted this idea. Her description of the current drop in the birth rate and cultural change in Europe is marked by pessimism. In a model about the interaction between population, environment, technology, labour market, family structures and culture, she assumes that western Europe has handed over its technological pioneer role to the USA and Japan and that the labour market situation has changed behavioural patterns.

Figure 1:

Boserup's model of the current development in western Europe with a drop in the birth rate and changing values



E = Environment
P = Population
T = Technology level
O = Occupational structure
F = Family structure
C = Culture

The starting point for the model is the labour market (O). The arrows O ⇒ T ⇒ O are used to show that traditional employment is decreasing as a consequence of technical change and that, at the same time, technical and more highly qualified occupations are gaining ground. Family structures are changing (O ⇒ F) in that activities outside the home are on the increase and child care is being increasingly institutionalised. Formal partnerships and the number of children people are having are on the decline. Employed, qualified women are gaining in status, housewives and mothers are losing status (F ⇒ C). Opposition to immigration is growing, the population is stagnant or shrinking (C ⇒ P). Technical change is triggering further influences on culture: doubts are growing about the sustained ability and reliability of energy sources (T ⇒ E ⇒ C). Furthermore, Boserup assumes that the secularisation of scientific ideas goes hand in hand with growing uncertainty which can encourage superstition and religious fundamentalism (T ⇒ C) (Boserup 1996, 510-514). It is not possible at this point to examine these complex ideas in any greater depth. One main test criterion would be whether the labour market and culture in western Europe are indeed subject to further segmentation in the manner described.

What are more relevant are current statements about the production factor labour. It is generally assumed that in a shrinking population the quality of work deteriorates because of a greater devaluation of existing qualifications and more reduced occupational mobility in the ageing labour force potential. Opinions of this kind are not based on any empirical evidence (Johnson/Zimmermann 1993). On the other hand, they cry out for those qualifications to be taken as the focus which are not tailored to specific occupations or companies.

In terms of use of the national product, the question is whether the performance of the working population will suffice in order to cover the needs of those groups in the population which are growing in size but which are not yet or no longer in employment. It is true that the relative proportion of young and older age groups in the population was sometimes higher in past decades than it is today. As a rule, per capita use of the national product is considerably higher for old people than it is for young people. That is why ageing is a difficult, so far unknown problem.

The volume of goods and services produced must be increased further because of higher per capita consumption in future. In the case of the same or even dwindling labour force potential, this can be achieved by further work saving technical innovation and/or increasing the labour force participation. The formal qualifications of the labour force must be increased in a disproportionate manner. This is shown by a model from a new labour market theory according to which the qualifications of an employee are determined by the sum of his school education and his work experience. If in-company experience is limited, this must be compensated by a higher level of education.

This link is a result of Mincer's earnings function

$$\ln w = ß_0 + ß_1 s + ß_2 t + ß_3 t^2 + u$$

in which the rate of earning is w, the level of education s, the work experience t, the unobserved term u and the parameters for estimation ß (Mincer 1974, Hartog et al. 1993).

One important factor when it comes to improving the quality of work is training. One yardstick for this could be the human resources available to a national economy. This has increased considerably in the last decade (Buttler, Tessaring 1993). One optimistic observation might be that the training costs for society as a whole tend to be reduced when there is a reduction in the size of up-and-coming generations (Blanchet 1993). The decisive factor is not, however, the level of expenditure on human resources stocks but rather its usefulness. As Külp already observed (1967; for further criticism about the human resources approach, cf. Sesselmeier/Blauermel 1990), an improvement in the quality of work only means a true increase in prosperity "when there is demand for this so very well trained labour force".

According to Rürup (1997), a further damper on the hope of achieving more growth through productivity stems from the observation, "that the growth rates of productivity and growth are constantly shrinking in parallel to each other. Empirical studies also confirm that these two parameters are interdependent. This means that in the long term productivity obviously cannot increase any more than economic growth (and, by extension, than the national product). Hence, it is unlikely that there will be a situation of constant growth in the national product by compensating for the smaller working population by means of independent control of the growth rate of productivity. A further empirical observation has to do with the so called "employment threshold". This is the term used to describe the percentage of economic growth which has neither positive nor negative effects on employment. This means that this neutral growth rate of the national product in terms of employment neither creates nor dismantles jobs. In the presence of an economic growth which is above or below the employment threshold, the size of the labour force grows or shrinks. The „employment threshold" which is currently 1% has fallen steadily over the last 30 years. This development shows that lower economic growth can still have positive effects on employment and that they are in fact directed rather against the desirable development of framework conditions in future. Against the backdrop of demographic development the factor "labour" could develop into a parameter which restricts economic growth as a consequence of the fall in the size of the workforce. Taken together, these considerations lead to the conclusion that the expected increase in productivity will not be able to compensate for the deficits in the offer of work. Given the interdependencies mentioned above it is likely that a smaller workforce will go hand in hand with a drop in economic growth" (Rürup 1997, Rürup/Sesselmeier 1993).

The European Union itself has tried to express this dilemma of future employment and productivity in figures. An analysis was made of what proportion of annual growth of per capita productivity (work productivity per employee) was used for pensions.

"In the next ten years this proportion will continue to be on a scale similar to that in the past, i.e. it will be between 0.1% and 0.3%. After the year 2005, however, the demographic effects will be stronger and they will probably amount to 0.5% per year." The report continues, "Let's take three examples for which constant growth of 1%, 2% and 3% is assumed up to the year 2025. According to the results of this scenario real growth, following the deduction of what the demographic burden would "cost", would only be 0.5%, 1.5% or 2.5%. This would constitute a considerable effect." (European Commission 1996).

3.2 Qualification requirements

The forecast of quantitative labour demands was also linked to qualitative estimates. Demands for higher and different types of qualification have been prompted by requirements on the labour market on the one hand and the need to secure employment on the other. The basic idea behind the demands for different types of qualification is that „key qualifications" (Mertens 1974) are thought to offer more of a guarantee for the future than qualifications which are too closely tailored to occupational activities although these are not to be neglected either. In more recent comments it was stated that,

"in future the focus [...] will be on learning for occupational work [...]. There is increasing demand for general work qualifications which enable the employee to understand and master complex technical and social connections in their concrete work activities. What are meant here are skills such as analytical thinking, an ability to diagnose and plan, imagination, creativity and an ability to cooperate and communicate. General work skills are developed along with special work qualifications (special occupational qualifications) which will continue to be essential and will not lose ground in terms of volume either. It is far more the case that additional qualifications will be needed alongside general qualifications" (Dedering 1995).

Demands for a higher qualification of the workforce can refer to analyses of workplace requirements so far. In the case of the Federal Republic of Germany the following was observed,

"The qualification structure of the workforce as a whole [...] was characterised by a clear shift towards medium and higher qualification levels and a lesser demand for „unskilled" labour. In

1976 approximately 35% of the entire working force of 24.5 million had not completed vocational training. Just over half (51%) had completed in-company or school training, 6.5% technical school and slightly more than 7% training in polytechnics or universities. Up to 1987 the structure of qualifications changed considerably. Jobs for the unskilled dropped by more than 2.6 million; the proportion of unskilled workers in the working population fell to 23%. In parallel to this, the number of working people increased who had in-company or school training (share of the working population with in-company training was dominant within this group at just under 90%) by over 2.1 million to 58%, the other qualification levels from approximately 400,000 to over 500,000. The people who had completed technical schooling accounted for just under 8% and university graduates approximately 11% of the working population." (Tessaring 1991, cf. BLK Commission for Educational Planning and Research Support 1995).

A further increase in the qualifications of the labour force is expected in future. In the year 2010, according to a forecast for Germany, only 10% of jobs will be held by people without a formal training certificate. The share of people who have undergone initial vocational training or further training will increase to 72% or 73%, the share of university graduates from 17% to 18% (Tessaring 1994).

Similar trends can be observed in the Member States of the EU in terms of the development of qualification requirements:

- "despite different economic structures, a shift in qualification requirements can be observed in all countries towards more qualified activities to the detriment of auxiliary activities.
- there are greater differences between the countries in terms of the need for qualified technical activities. This need is increasing particularly dramatically in Greece, Portugal and Spain. This is a consequence of the further industrialisation to be expected in these countries" (Baur/Schärer/Schweikert 1994).

This demand for higher qualification is also based on past experience indicating that the risk of unemployment was lower when there was a higher level of general and vocational training. In OECD Member States at the beginning of the 1990s unemployment amongst the unskilled or semi-skilled was above average (OECD Jobs Study 1994). Broad training does not automatically offer protection against unemployment. In Australia, Canada and the USA the numbers of skilled and unskilled unemployed individuals have come closer to each other since the 1980s. This is probably linked to the growing divide in wages and salaries in these countries (Commission Bavaria and Saxony 1996).

3.3 The influence of education on demographic development

It should be mentioned in passing that it is not just demographic developments which affect the labour market and vocational training. Education also influences the demographic behaviour of people.

The fact that women with a higher level of education have fewer children attracted considerable attention. A causal link is often assumed. Blossfeld and Jaenichen by contrast interpreted this in a different way. They differentiated between an institutional effect of education on the one hand, i.e. whether an educational institute was attended, and the level of education on the other hand:

"Participation in the education system [has] a significant negative effect on the time of pregnancy. In society there are normative expectations [...] concerning motherhood whereby training activities and the obligations which result from being a mother cannot be reconciled. Termination of training, an important step in adult status, therefore leads to a rapid increase in the inclination of women to have children."

For the "birth of the first child the level of education [has] no significantly negative, i.e. postponing effect. The growing level of education amongst women does not, therefore, lead to a lesser inclination to have children as was predicted by the human resources theory."

"If the higher qualification of women does have an effect on motherhood, then this is only linked with participation in education. This effect is restricted [...] to a short transitional phase and merely leads to a postponement of motherhood without motherhood itself being fundamentally challenged." (Blossfeld/Jaenichen 1993).

The theory of Blossfeld inter alia that the importance of the level of education was underestimated and that the postponement of motherhood depended less on this and more on the status of education has since been confirmed amongst other things by a random sample of 35 to 60 year old women in west Germany (Hullen 1995). What proved to be the decisive factor for the higher age at which more highly educated women had there first child was the longer amount of time they spent in training. The established norm that no families are established during the training phase was maintained. One critical comment here is that these studies did not even attempt to clarify how many women dropped out of training because they were pregnant.

The number of children living in a home is normally equated with a drop in the work involvement of women. Vice versa, involvement in the world of work remains high when pregnancies are postponed for educational reasons. This effect, however, varies considerably in the Member States of the European Union. A survey undertaken in 1990 showed that the presence of children had the least influence on the work involvement of women in Denmark, the Member State of the then European Community with the best child care facilities. In countries with a lower level of child care the presence of a child led to a dramatic drop in work involvement (Knauth 1992). One historical example for the ability of a state to exercise control is that women in the former GDR scarcely postponed the birth of their first child because of their educational involvement. This led to a far lower degree than in the west to the later founding of a family (Hullen 1997).

4. CONSEQUENCES OF DEMOGRAPHIC DEVELOPMENTS FOR TRAINING

It has proved very difficult to collect up-to-date information on the consequences of demographic developments for vocational training. There are (still) hardly any reports on the links between demography, economic and education. Research in the relevant "Population Index", even in the entire Internet for documents in which the words "demography" and "education" or their translations appear simultaneously, led at best to literature which dealt with the treatment of demography in instruction but not with the influence of demographic development on education.

That was not always the case. In the years of educational reform, in Germany this was the decade from 1965 to 1975, human resources were thought to have a far greater effect on the national product than is the case today. The size of human resources in turn is shaped by the demographic basis and the demand of people requiring education for education. The oil price shock (1974) and growing unemployment in the 1970s and 1980s buried the optimistic assumptions of continuing economic growth in industrial countries based also on investment in education. The expectations that the labour market problems of young people in the smaller cohorts would be reduced (e.g. OECD 1984) were not met in most west European countries (OECD Employment Outlook 1996). However, the quantitative effects of demographic development continued to be important for the labour market and education.

Secondly, the structure of the population has changed in Europe as a consequence of immigration. This was a desired development in the 1960s in order to overcome the shortage of labour; in the past decade this was more strongly characterised by people seeking asylum in western democracies.

There are other demographic factors which influence developments on the labour market and which should be mentioned briefly here such as the increasing employment of women and the extended school and training times. Finally, it should be pointed out that people in employment today retire earlier than was the case of previous generations - a phenomenon which itself is of course also influenced by the labour market.

4.1 Relatively large age groups today, smaller groups in future

The situation in vocational training at the beginning of the decade is described by the European Commission as follows:

- In 1991/92 60% of young people attended a vocational school in the higher secondary level (63% of male and 58% of female young people).
- Public expenditure for vocational training programmes amounted in 1993 to 0.5% of the GDP compared with 0.25% in 1985. It is assumed that employers spend approximately 1.5% of their payrolls on vocational training.
- At least 20% of the working population in the European Union attend initial or continuing vocational training programmes of some kind which last on average 1 to 2 weeks. According to a survey from 1993 approximately 5% of male and 6% of female employees aged over 25 had attended a vocational training scheme in the four weeks immediately prior to the survey in 12 Member States.
- The role of the private sector as a provider of training has increased considerably. The estimated number of training providers in the European Union is more than 60,000.
- Although there are more than 3,000 higher education institutions in the European Union, they only play a minor role in continuing training. Based on the overall number of participants, the share of higher education institutions in France is 5%, in Germany 2% to 3% whereas it is more than 10% in Scandinavian countries and the United Kingdom.
- Participation in continuing vocational training depends on the level of education. In the Member States for which data were available, the figures indicated that people who had successfully concluded secondary level two took part to a greater degree in continuing training programmes than people who had successfully concluded secondary level one. (European Commission 1995, 87-88).

In the next ten years the young age groups entering the labour market will remain more or less the same, those which follow however will be smaller. This is presented in greater detail in Chapter five. Similar forecasts were made by the Statistical Office of the European Union (Eurostat) and Prognos AG. They agree in principle with other forecasts (for Germany - Klauder 1993; Grütz et al 1993; Thon 1995; for the United Kingdom cf. Conway Foundation, West 1993). They all face the dilemma of getting people to understand that the relatively tight labour market situation will soon be followed by a period in which the supply of jobs will exceed demand.

Many earlier forecasts were weak and therefore reduce people's belief in today's work. It was frequently the case that a reduction in unemployment was expected for the 1990s. Aside from the difficulty of predicting the economic situation, these forecasts have not taken sufficient account of the relatively constant number of births (the "echo" of the baby boom in the 1960s did not result in their being constantly reduced in the 1980s and the growth of the western European population as a result of immigration.

So far scarcely any conclusions have been drawn for initial vocational training from the expected demographic development. One exception would appear to be the appeal made in the United Kingdom which assumes that people entering the labour market now should be able to remain in employment up to the year 2030. It was important to give them qualifications which would enable them to cope with technical change in the future too. A first step in this direction was the comparability of vocational training systems in the European Union which was reported on in a short paper (Conway Foundation, West 1993). For Germany an "overall educational calculation" indicated that the number of pupils in initial continuing training will shrink from the year 2010 onwards because of the smaller size of the up-and-coming age groups even if the willingness to undergo training was to continue to grow (Reinberg et al., 1995). Otherwise, there are of course scenarios for shorter forecast periods as are used by educational authorities for teacher recruitment and school building planning. These will not be discussed here. Longer

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term quantitative considerations are more rare. By way of example we could mention the following: Wörner 1997 with his most recent forecasts of the need for training places in Baden-Württemberg; Beer, Visser 1994 for the Netherlands; Landler 1997 for Austria; Hullen 1985 for a medium-term forecast of job requirements). There are no statements about qualitative changes in vocational training related to demographic factors.

"Negative reports" of this kind might seem somewhat ambitious. The author does not claim to have a complete overview of the area under review.. This assumption is, however, supported by two important facts.

The European Union is increasingly assuming responsibility for shaping initial vocational training in its Member States. Of course this also involves future requirements. So far, however, scarcely any mention has been made of the importance of demographic developments.

This situation is quite different in the case of continuing training. In one area of research which is rapidly attracting attention, changes in continuing training are being explained by increased ageing and future shrinking of the labour force potential and in Germany at least concrete steps are also being taken to prepare for these changes. This should encourage people to reflect on the effects of demography on initial vocational training, too, and to take effective action.

4.2 Ageing

In this section research approaches are presented which address the consequences of demographic developments on older employees and draw conclusions for continuing training. This is done on the one hand in order to broaden the subject since continuing training is also part of vocational training. On the other hand this can help to identify the perspectives of further research which would be important for initial vocational training.

One aspect of demographic ageing is the shift in the average age of the labour force potential or working population. Here it is normally assumed that older employees have a lower level of qualification because of the risk of "dequalification" and the company-specific, narrow nature of qualifications. Furthermore, differences in intergenerational qualification levels have a negative effect and there is an age-related change in performance.

Some comments on this:

"Dequalification happens when new qualifications are required which older employees do not or do not yet have either because they did not obtain them within the framework of their school/vocational training or because a new type of occupational knowledge is required which can only be obtained by means of extensive continuing training. This is [...] normally only held by younger employees. Furthermore some or all of the qualifications of older employees may become obsolete when there is no longer any need for these qualifications because of the arrival of new technologies or a new distribution of tasks at the workplace [...] A narrowing of qualifications in companies is triggered by a decade-long concentration on specific processes, work areas or work schedules and may mean that the original qualifications are in some cases considerably impaired ("disuse effect") [...] Intergenerational qualification differences constantly occur because the younger cohorts of vocational trainees generally have a higher formal level of initial qualifications [...] Furthermore, partly because of this the younger cohorts also undergo to a greater degree continuing vocational training [...] The theory of a change in performance is an indication, in respect of the cognitive performance of older employees, of an age-related shift within cognitive performance traits [...] The loss of ability to learn should not in principle [...] be viewed as a consequence of age but of disuse, i.e. it is, amongst other things, the result of a work biography with a lack of continuous work-related learning requirements and learning opportunities." (Barkholdt, Frerichs, Naegele 1995; cf. Lehr 1978).

Continuing training must take account of these phenomena and develop itself. Block and Klemm have pointed out that the "necessary transfer of innovation in the employment system [...] can be undertaken less and less by newcomers to the occupation". They called for an increase in continuing training provision for older employees and also for those people with no or the wrong qualifications and for immigrants. "A waste of qualification" should be avoided (Block/Klemm 1994).

Research is now being undertaken in which changes in continuing training are being tested for older employees. The projects which attracted attention are "employment in the future - prospective work design and personnel resources planning for older employees, too" of the Technical University Dresden (Köchling 1997) and "changes in in-company age composition: organisational challenges" of the Hans Böckler Foundation of the German Trade Union Confederation (DGB).

4.3 Ethnic plurality

The large influx of foreigners into the core countries of the European Union and the earlier "migrant worker immigration" have led to growing ethnic plurality amongst school pupils. No extensive report can be made at this point about the situation in those countries. To this end we not only need comparable data. We would also have to interpret the different attitudes of countries concerning the extent to which their schools should take note of the ethnic-cultural differences between pupils. These attitudes range from the consistent expectation of cultural assimilation up to the propagation of a multicultural society. One example for the extensive recognition and support of mother tongues in a culturally-aware pluralist society can be found in Australia (Smolicz 1990, 1997).

The following figures concern the situation in Germany (Stevens, Michalski 1994 reported briefly about the US situation). In the Federal Republic of Germany efforts are made to integrate foreign children and young people into the education and training system. What this means is that pupils of foreign origin should have the same opportunities as others, that there should be no different level of participation in education and that, at the same time, links to their culture of origin should be maintained. Instruction for example in their mother tongue serves this purpose as does giving the same priority to specific languages of origin as are given to languages traditionally taught in Germany.

The foreign pupils are by no means a homogenous group. They include children born there, who have grown up there in the second and third generation as well as new immigrants, children of war refugees and people seeking asylum. In 1994 Germany had a total of 1.14 million foreign pupils, 870,000 of them in general schools, 240,000 in vocational schools. The following comments are based on "Ausländer in Deutschland [Foreigners in Germany] 1/97" which compiles the findings of studies by the German Institute for Economic Research and by SIGMA/Friedrich Ebert Foundation". There was a higher level of school attendance by young foreigners than in the mid 1980s but ten years on there are still major differences compared with Germans of the same age. Foreign young people are underrepresented in lower secondary schools and grammar schools. There is an above average number of foreigners in secondary modern schools, comprehensive schools and special schools. The ratio of young people successfully completing education has increased in the course of the last few decades. The level of participation of young Italians and Greeks in education, to mention two larger groups, is the same as that of young Germans. However, the overall level of participation of foreigners in education was lower.

The differences on completion of general schools are even more obvious in the case of vocational training. The share of foreign apprentices amongst all trainees has continued to grow in absolute and relative terms - from around 51,000 (2.8%) in 1985 to 125,000 (9.7%) in 1995. However participation in training is still considerably lower than that of the Germans. Two-thirds of all Germans in vocational schools found a training place, only one in two of foreigners. There are also characteristic differences in the choice of training occupations. The foreigners were mainly trained in manufacturing occupations; by contrast in technical and in most service occupations they were under-represented.

The reasons for the different level of participation in training can be found in the demand for training amongst foreigners and also in the programmes of schools and in the behaviour of employers. "Foreigners in Germany", issue 1/97 sums this up in the following way:

"The reasons for this gap are manifold. They range from inadequate school preconditions over language deficits to (despite all types of information campaigns) the widespread attitude of wanting to earn money as soon as possible after leaving school. The shortage of training places and the reservations of some employers vis-à-vis foreigners also play [...] a role".

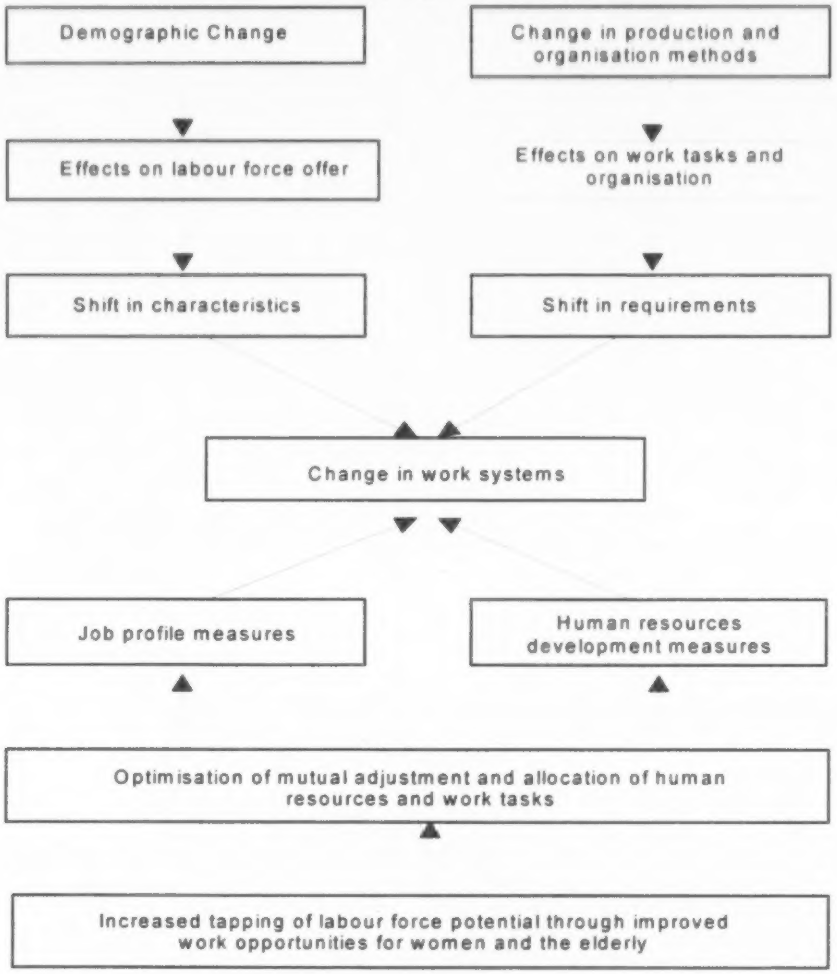
4.4 Summary

The demographic development in the last and next few decades in the European Union was and is mainly shaped by the generation of the "baby boomers". These are the people who were born in the 1950s and 1960s. Prior to this and after that most countries had lower birth figures.

The working life of that generation is marked by quantitative adaptation problems, a shortage of training places in the 1970s and 80s and the ensuing high level of unemployment. When they retire from working life around the year 2010, the demographic ageing process will be given a major impetus and the following age groups will be expected to shoulder increased social security contributions for the baby boomers who are now the older generation.

Figure 2:

Influence and shaping of the work systems


Demographic Change
Change in production and organisation methods
Effects on labour force offer
Effects on work tasks and organisation
Shift in characteristics
Shift in requirements
Change in work systems
Job profile measures
Human resources development measures
Optimisation of mutual adjustment and allocation of human resources and work tasks
Increased tapping of labour force potential through improved work opportunities for women and the elderly

Source: Lorenz 1997:147

Other demographic changes which affect the labour market and vocational training are the high degree of migration towards Europe and the changed role of women which is expressed in their greater participation in the world of work.

If we wish to examine what changes have taken place and will take place in the education and training and employment systems, we should not forget the parallel influences of production and organisation methods. Lorenz (1997: 147, cf. Fig. 2) describes this as a change in the "work systems" through "shifts" both in the characteristics of the labour force and in workplace requirements. Corresponding changes and mutual adaptation in work design and in human resources development will have to complement each other. Lorenz mentions the increased participation of women and older people in the world of work as an important step towards making better use of labour force potential.

Shifts in the characteristics of the labour force, to use Lorenz' term, are the „trade" of the education system beginning with general education and then in vocational training. From the pedagogical angle, which is confirmed by the labour market development so far, improved qualification of the workforce is necessary, not only of its younger members but also more particularly for its older members who are growing in number. The Member States of the European Union have adopted very different approaches in the past to learning venues and the contents of this improved qualification strategy. The main criteria are of course pedagogical and/or economic. In future demographic aspects are to be taken into consideration, too.

5. RESEARCH TASKS

This chapter endeavours to present studies which could help to improve vocational training from the demographic angle. These comments should be seen as an initial putting out of feelers about challenges and opportunities. Planning vocational training is difficult anyway and studies carried out so far which did not take account of demographic aspects do not always offer clear answers to broad issues such as those formulated by the international occupational scientist Bowman:

- "Can or should we endeavour to forecast the details of future qualification demand and should these forecasts be the guidelines for educational policy?
- How can we prepare young people not just for a forecast labour market development for [the next two or seven years] but also plan on the basis of permanent change the next forty or more years?
- What general conclusions can be drawn from experience with "general" or "vocational" secondary education?
- What is mainly taught most effectively in schools, compared with other institutions or at the workplace?
- In what way could the potential strength of state schools be linked with the shorter duration of private schools and on-the-job training?
- Which labour market measures could improve training and promote human resources at the workplace?" (Bowman 1997 [1988]).

Given these doubts about the pedagogic and/or economic foundations for educational planning, it is scarcely surprising that demographic aspects so far were only rarely taken into account even if this would have been necessary as the above description of demography-related problems on the labour market shows.

5.1 Quantitative structures

It is quite obvious that the most important contribution of demography to vocational training involves determining and also predicting the size of relevant population groups. This is not particularly difficult for a forecast period of 15 or 20 years at first glance since the future trainees are already born. Some clouding may be introduced by immigration and emigration. Furthermore, considerable shifts in flows of pupils may be triggered by changes in the education system perhaps as a consequence of the setting up of new training courses, by psychological effects or for example by the educational reform in the 1960s and 70s as well as by the behaviour of people seeking education and training. The keywords for changes in the education system are the selection or abandoning of specific training courses, greater transparency in the education and training systems, which admit several options, multi-training, extensions of the overall training duration and increases in the age at which people enter the world of work.

Furthermore, demography must provide information about the structure of those seeking education and training. They can be broken down into the schools which they visit prior to entering vocational training institutions. It may also be of importance for quantitative planning to be familiar with their ethnic structure. The following chapter examines the pedagogical and political aspects which should perhaps be taken into consideration.

5.2 Learning preconditions

The identification of learning preconditions could be viewed as a joint task for educational science and demography. This is currently being demonstrated in the "International Adult Literacy Survey", an OECD project which is being coordinated by the Canadian Statistics Office (Statistics Canada 1994). Fundamental cognitive skills of the population were observed in Germany, the Netherlands, France, Switzerland, the USA and Canada, a second round is to bring in an additional twelve countries.

Gerontology, a research direction for which cooperation between demography and various other sciences is absolutely essential, has become important for continuing training. It is thanks to this research that valuable approaches have been adopted to the learning preconditions of older people. What should also be stressed here are the "positive" properties of older employees (Naegele 1988; Baur et al. 1994) and the differences between crystallised intelligence which is linked to experience and knowledge and therefore increases as people grow older and fluid intelligence which describes the skills and know-how required to solve new types of cognitive problems which is dependent on brain function and decreases as people grow older (Staufer 1992; Kruse/Lehr 1996).

5.3 Training contents

Training contents should be tailored to the anthropogenic preconditions of trainees. Besides gender, ethnic and cultural differences are also important. Demography can quantify them. Furthermore, demography can help to analyse which population-relevant, political ideas determine the contents for example of language instruction and political education.

Finally, demographic research can contribute to analysing which demographic learning contents are taught in schools. Mention should be made here of the European Observatory for Population Education and Information (EOPEI). The Observatory was founded in Paris in October 1993 by universities and population study institutes from France (Université René Descartes), Italy (Instituto di Ricerche sulla Popolazione), from the Netherlands (Nederlands Interdisciplinair Demografisch Instituut) and from the Czech Republic (Univerzita Karlova, Prague). In the meantime cooperation has been developed with other institutes from these countries and with Switzerland, Belgium, Greece, Romania, Russia and Turkey. The Observatory focuses above all on population-relevant education in schools. Comparative research and evaluations of curricula are also to be undertaken. The international synopsis is under the banner of educating people to become European citizens.

The work of the Observatory could fill a research gap. It is probably the case that we know less today about demographic education in industrial countries than we do about demographic education in many countries in the Third World. This discipline should be given recognition. It begins with geography and history as subjects with a relatively sound foundation in order to create a base for the analysis of other areas in schools. This will also focus attention on teacher training particularly when we think about the necessary links in social studies between demographic subjects and political education (Hullen 1996).

5.4 Educational results

One broad field in this connection is the examination of the future career paths of people who have completed the education system. This involves both quantitative and qualitative links between education and employment, social background and later social position, cohorts and cyclic effects on the course of people's lives (cf. Kaiser/Nuthmann/Stegmann 1985). One example is work on the position of academics in the employment system. The increase in their below level employment led to the question whether structural change was taking place on the labour market (cf. Parmentier/Schreyer/Tessaring 1996; for studies on the fate of secondary school leavers cf. Hullen 1983). Demography with its tools could help to undertake longitudinal analyses.

5.5 Coordination

The aim must be to coordinate developments in Europe. The Community programmes of the European Union in the field of education are examples of possible paths to be adopted. The first generation with Erasmus, Lingua and Comett as is emphasised by the European Commission itself, "contributed to strategically improving the level of education and training of some groups in the population of Europe [...] They helped to remove obstacles to supranational cooperation and mobility. They upgraded the status of language instruction. They made possible European cooperation, improved knowledge and greater understanding of the reality of European partnerships. They encouraged individuals and educational institutions to enter into numerous European partnerships. Finally, they led to the gradual recognition of study periods undertaken abroad" (Le Magazine 5/1996).

In 1995 the Socrates programme was introduced which also includes economic activities under the name of Leonardo da Vinci. Five priorities were laid down in the call for interest for 1996:

The acquisition of new skills, new employment which can open up new employment prospects in particular by adapting education to developments in work organisation, to technological developments or social change by means of improved language knowledge and through the acquisition and validation of core skills.

The rapprochement between in-school or vocational training institutes and industry, particularly by developing specialist areas and opportunities for mobility between different training paths taking into account all types of dual training, technology transfer and through promoting new forms of tutorship.

The struggle against exclusion, particularly by promoting training for people who are disadvantaged on the labour market and by improving the employment prospects, life-accompanying training paths and employment opportunities.

Promotion of investment in human resources, particularly by means of improved skills in resource planning, occupational guidance and occupational information, by developing individual plans for continuing vocational training and by developing new methods to overcome obstacles to education in small and medium-sized enterprises.

Smoothing general access to knowledge by drawing on the tools of the information society in respect of life-accompanying learning, particularly by promoting the production and use of media in open instruction and distance learning and multimedia software, by using virtual mobility, by means of the innovative application of teaching materials and by means of continuing training in these areas.

6. THE FUTURE DEMOGRAPHIC DEVELOPMENT IN THE EUROPEAN UNION, MORE SPECIFICALLY THAT OF 15 TO 25 YEAR OLDS

All Member States of the European Union are subject to so-called demographic ageing triggered by a birthrate which is below the reproduction level and increasing life expectations. Immigration, which has increased to a greater extent in some countries, for example in Germany in particular, than the natural demographic fluctuations may act as a break on ageing but will not be able to prevent it. In the course of the next few decades, the population of retirement age will even increase more than was the case in the past in both absolute and relative terms whereas the age groups of children and young people will become smaller. The labour force potential, which is made up of the age groups 20 to 59, will remain more or less the same but will also be subject to specific ageing.

6.1 Scenarios by Eurostat and Prognos

The Statistical Office of the European Union (Eurostat) commissioned scenarios of demographic and labour force developments up to the year 2050 from several research institutions under the aegis of the Dutch Statistical Office. The results of five scenarios were presented which differed in terms of assumptions about fertility, life expectation, migration and work participation. In a first scenario all these parameters are high, in a second they follow the trend, in a third they are all low. In a fourth scenario a "young population" was identified with a high degree of fertility, low life expectation, high migration level and low participation in working life. In a fifth there was an "old population" with contrary assumptions (Table 1). The trend scenario (baseline) is closest to the actual scenarios of EU Member States. Selected results are presented in the "Population Statistics 1996" of Eurostat, others can be obtained on CD-Rom.

Table 1:

Eurostat scenarios on population forecasts

	High	Baseline	Low	Young	Old
Fertility	High	Trend	Low	High	Low
Life expectation	High	Trend	Low	Low	High
Immigration	High	Trend	Low	High	Low
Work participation	High	Trend	Low	Low	High

The Basel-based Prognos AG presented its "World Report '97" which is a continuation of earlier work. In one of the two volumes, both the demographic and economic future of western European countries, USA, Japan and Canada is forecast. Data on population development are given up to the year 2010, all other data up to the year 2005 (Prognos 1996).

Tables 2 to 4 present the empirical values for fertility, life expectation and migration rates (year 1994) together with the values used in the trend scenario of Eurostat and that of Prognos. As you can see, both institutions assume a constant total fertility rate for many EU Member States. They do, however, expect a minor increase for some as a consequence of improved family promotion and the reconcilability of an occupation and a family (the total fertility rate gives the average number of children per woman). Prognos expects an increase in births particularly amongst older fertile women. In the EU the fertility rate as a whole, according to Eurostat estimates, could increase between now and the year 2020 from 1.6 to 1.8. Eurostat expects an increase in life expectation for men of 2 years to around 76 years, and for women by 2 to around 82 years. The age-specific mortality figures used in the Prognos scenario are too highly differentiated for them to be repeated here. Finally, in its trend scenario Eurostat expects a reduction in the annual migration balance of EU Member States from the current level of three-quarters of a million to 620,000 in 2005 and a further half million reduction by the year 2020. The migration balance is made up of the surplus of immigrants over with emigrants. Prognos does not give any details of this.

Table 2:

Total fertility rate

	1994	Prognos 2005	Eurostat (Baseline) 2005
Belgium	1,6	1,6	1,7
Denmark	1,8	1,8	1,8
Finland	1,9	1,8	1,8
France	1,7	1,7	1,8
Germany	1,3	1,5	1,5
Greece	1,4	1,4	1,7
Ireland	1,9	1,8	1,8
Italy	1,2	1,4	1,5
Luxembourg	1,7	1,7	1,7
Netherlands	1,6	1,6	1,7
Austria	1,5	1,5	1,6
Portugal	1,4	1,5	1,6
Spain	1,2	1,4	1,4
Sweden	1,9	1,9	1,9
GB	1,7	1,8	1,7
EU	**1,6**	-	**1,6**

Sources: Prognos, Eurostat

Table 3:

Life expectation at birth (in years)

	Men		Women	
	1994	2005	1994	2005
Belgium	73,0	76,1	79,8	82,2
Denmark	72,5	74,7	77,8	79,1
Finland	72,1	74,2	79,5	81,4
France	73,6	75,8	81,8	83,6
Germany	73,3	75,1	79,6	81,1
Greece	74,9	77,2	79,9	81,8
Ireland	72,3	74,9	77,9	80,2
Italy	74,7	76,1	81,2	82,4
Luxembourg	72,6	75,8	79,1	81,2
Netherlands	74,6	76,3	80,3	81,7
Austria	73,3	75,0	79,7	81,1
Portugal	71,2	72,8	78,2	79,8
Spain	73,3	75,0	80,9	82,5
Sweden	76,1	77,5	81,3	82,2
GB	73,6	76,1	78,9	81,1
EU	**73,7**	**75,6**	**79,8**	**81,9**

Source: Eurostat

Table 4:

Migration rate (in thousands)

	1994	2005
Belgium	18	13
Denmark	11	11
Finland	4	5
France	58	50
Germany	340	283
Greece	28	23
Island	-1	0
Ireland	-10	-5
Italy	118	65
Luxembourg	4	2
Netherlands	19	34
Austria	13	19
Portugal	15	19
Spain	28	46
Sweden	51	18
GB	52	38
EU	751	620

Source: Eurostat

6.2 Labour force potential

This section gives the probable development of labour force potential. This covers the entire population aged between 20 and 59 without taking account of actual availability for the labour market or national differences and definitions.

The absolute size of the labour force potential is not likely to change very much in most Members States of the European Union between 1995 and 2010. The exceptions are Spain and France where the labour force potential is likely to increase considerably and Italy where it is likely to fall. The difficulties of making forecasts for Germany are demonstrated by the fact that Eurostat does not indicate any change whereas Prognos indicates a reduction by almost 4 million. According to Eurostat the total EU population of working age will be three million higher in the year 2010 than it was in 1995, whereas Prognos indicates it to be 4 million lower.

Table 5:

Population aged between 20 and 59 (labour force potential) in 1995 and estimates by Eurostat and Prognos for the year 2010, in thousands

		Eurostat	Prognos
	1995	2010	2010
Belgium	5.529	5.618	5.458
Denmark	2.945	2.874	2.743
Finland	47.110	47.153	43.321
France	5.641	5.945	5.684
Germany	21.296	22.654	22.201
Greece	31.240	32.918	32.256
Ireland	1.816	1.983	2.181
Italy	32.230	31.010	30.301
Luxembourg	229	255	218
Netherlands	8.933	9.090	8.738
Austria	4.573	4.625	4.445
Portugal	5.352	5.682	5.513
Spain	2.832	2.787	2.737
Sweden	4.692	4.682	4.504
GB	31.693	32.327	31.678
EU	206.166	209.656	201.978

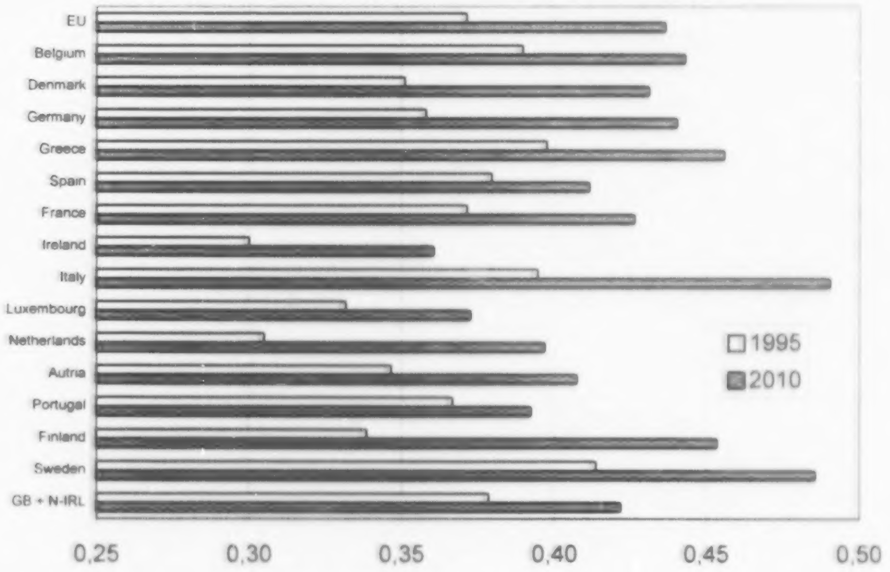
Source: Eurostat

The almost unchanged labour force potential is set against a growing number of people over 59. Age groups with high birth rates are reaching retirement age and the size ratio of the older to the 20 to 59 year olds will continually increase into the fourth decade of the next century. The development up to the year 2010 - which can be predicted with a high degree of reliability since these age groups are already born - is presented here with the help of the findings of Eurostat. Comparisons with the forecasts of Prognos scarcely show any differences at least in the case of the large EU member states.

For each person of working age today in the European Union, there are 0.37 over 59 year olds (Fig. 3). The situation is "more favourable" in the "younger" populations in Ireland (0.3), the Netherlands and Finland and "less favourable" in Sweden (0.41), Greece and Italy. Germany is close to the average with 0.36. Up to the year 2010 this ratio for the EU as a whole and for Germany, too, will increase to 0.44. So far, Ireland, Luxembourg, the Netherlands and Portugal are well below this level. Italy and Sweden also have ratios which are far higher than average.

Figure 3:

Increase in older people in the European Union - proportion 60+ : 20 to 59 year olds, 1995 and 2010



Source: Eurostat, own calculations

In populations with the classical age pyramid, the older age groups are smaller than the younger ones. In industrialised countries the situation is the reverse. The next fifteen years will constitute a historical turnaround. Fig. 4 shows that there will soon be more older than younger people in the labour force potential of EU Member States, (still) with the exception of Portugal and Greece. On average the proportion of 40 to 59 year olds compared to 20 to 39 year olds will increase from 0.82 to 1.12. The increase will be considerable in Germany, Luxembourg, the Netherlands, Austria and Finland.

The shrinking of the younger labour force potential is linked to expectations that in future there will be more jobs for the up-and-coming generation and that unemployment will fall. In order to guarantee the national product, the work volume so far will be necessary if productivity remains on the same level. This can be achieved on the one hand by increasing labour force participation: There have been frequent discussions about prolonging working life and increased tapping of the female labour force potential. Furthermore, in connection with this work productivity can be increased, particularly as a consequence of greater qualification.

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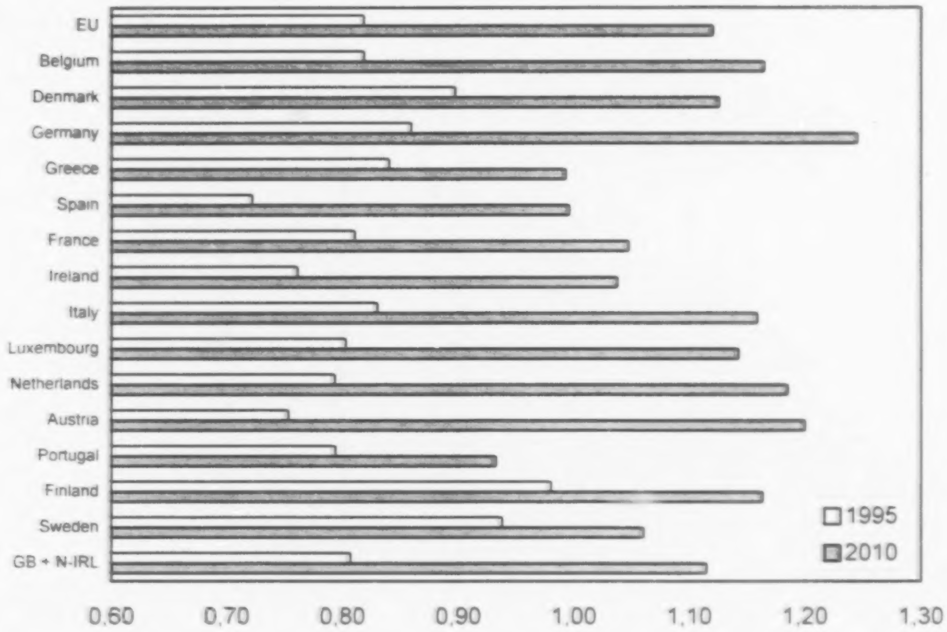
Figure 4:

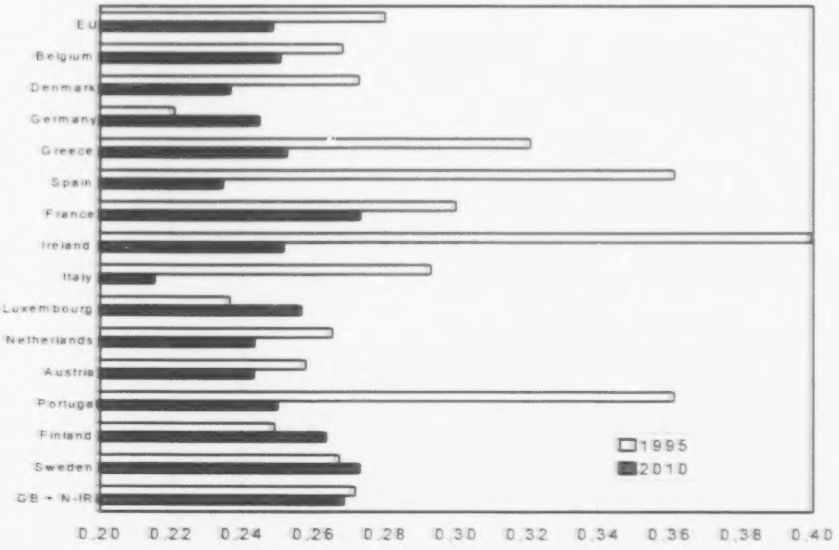
The ageing of labour force potential in the European Union - proportion of 40 to 59 year olds : 20 to 39 year olds, 1995 and 2010



Source: Eurostat, own calculations

Figure 5:

Drop in young age groups in the labour force potential of the European Union - proportion of 15-24 year olds : 25-59 year olds, 1995 and 2010



Source: Eurostat, own calculations

Training efforts of this kind will have to involve working individuals of all ages with of course greater emphasis on the younger age groups who are in transition from education to employment. This follows on from the tradition that occupational learning is concentrated on people aged roughly between 15 and 24 coupled with the trend of involving more and more young adults. In any case, learning is more effective when people are young. Fig. 5 sets 15 to 24 year olds against 25 to 59 year olds. This also demonstrates the process of ageing. The proportion falls in the EU from on average 0.28 in the year 1995 to 0.25 in the year 2010. Countries which have a “young” population such as Ireland and the Iberian countries will of course be especially hard hit. Other countries such as Sweden and the United Kingdom will scarcely experience any changes. Germany, Sweden and Finland may become special cases. According to the calculations of Eurostat, the ratios of their “educational age groups” to “working age groups” will increase up to the year 2010 in Germany from 0.22 to 0.24.

6.3 Access to labour force potential in the long term

So far attention has focused on the period up to 2010, a period whose working population is already born and is therefore very transparent. Forecasts for a more distant future are by contrast dependent on the assumptions of scenarios about the fertility rate. As a whole the following applies to the European Union: already in the base scenario with a slight increase in fertility, the annual new arrivals in the labour force potential will increase approximately from the year 2010 onwards. Of course, this increase will be greater in the case of a larger rise in fertility (in the scenario “high”, fertility and life expectation increase and the migration balance is high). If fertility falls (scenario “low”), there will be a continued reduction in new people entering the labour force.

This development is not taking the same course in all Member States of the European Union as is shown by Fig. 6 on annual access to labour force potential. If the population aged between 20 and 59 were a “steady population” in demographic terms, 2.5% would join this in order to further stabilise it. This is indicated by means of a broken line. The Figures clearly illustrate that this growth can currently only be observed in Ireland and in the case of rising fertility at best from around the year 2030 onwards in Finland, France and Sweden and perhaps even later in Belgium, Denmark, Luxembourg, the Netherlands and in the United Kingdom. Greece and the Iberian countries have proved to be special cases where access for a short time between 2020 and 2030 will come close to 2.5% but will then fall considerably again as a consequence of cyclical demographic developments.

In the event of low fertility and low migration (scenario “low”) only 2% of the labour force potential will be replaced in the European Union. This is only four-fifths of what would actually be required.

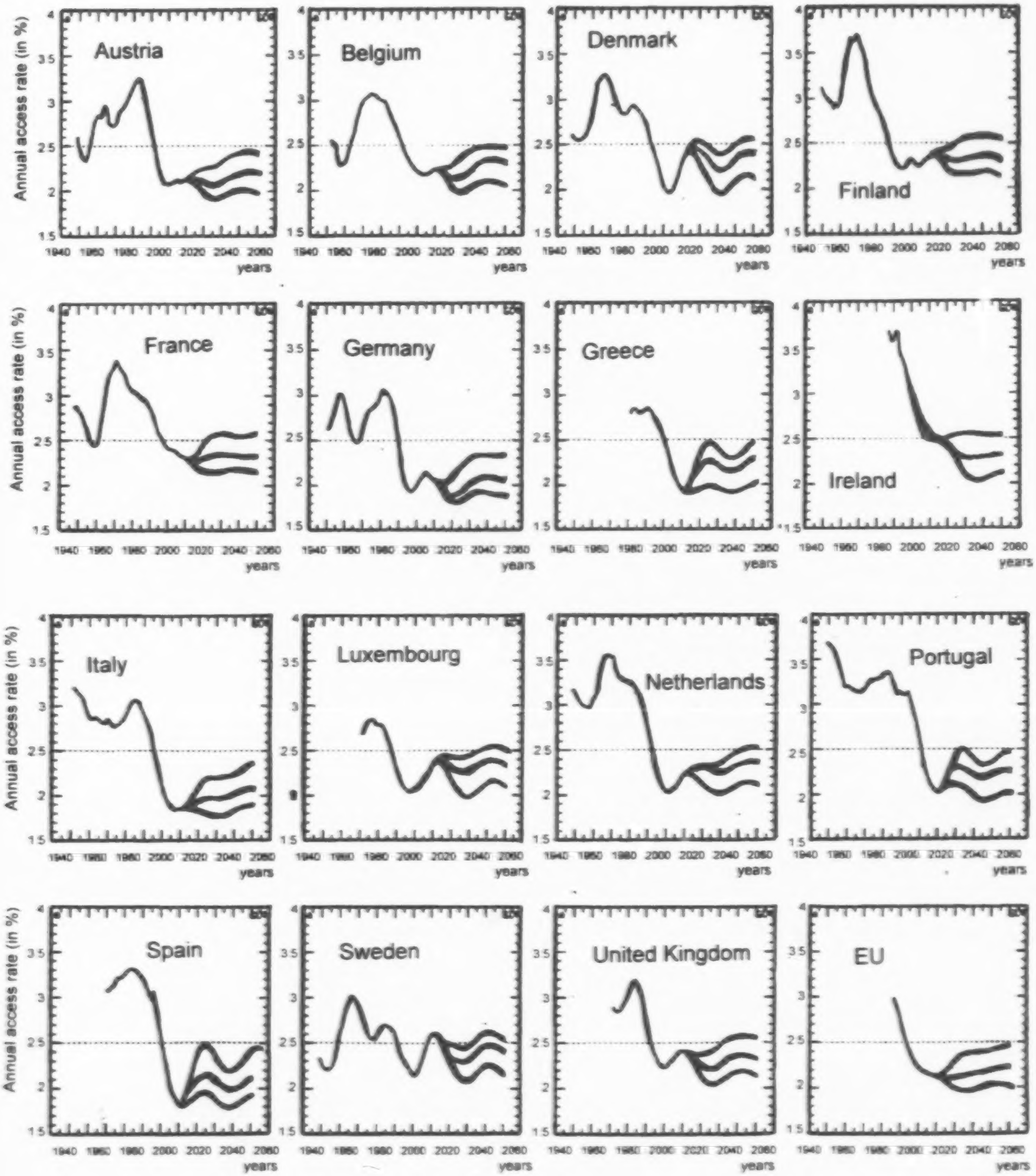
6.4 Participants in learning broken down according to areas of education

It seems appropriate to link forecasts about expected numbers of pupils to scenarios about the population. They are the necessary foundation for any form of state school administration. At least in terms of the school year, decisions are taken on this basis about the organisation of schools, needs for teachers and teaching aids.

In the short term forecasts of pupil numbers may be accurate. In the long term, however, they are rendered more difficult by the fact that school pupil figures are not determined on the basis of demographic development alone but also in conjunction with social components such as education policy, the labour market, educational wishes and educational science. This has to be taken into account in school pupil forecasts although this is not always the case. This does not make it any easier for the uninitiated reader to understand forecasts of pupil numbers. It, therefore, seems neither a good idea nor possible at this point to collect forecasts for pupils in vocational schools. Already in the case of Germany this would be anything but transparent given the number of regions with cultural autonomy. A glance at the statistics situation also draws attention to specific national features in the European Union.

Figure 6:

**Annual access to the population of people aged between 20 and 59
(from 1995 onwards in accordance with the Eurostat scenarios)**



Source: Calot et al. 1996

Table 6:

Age-specific participation rates in education and training (EU, around 1993)

	Upper secondary education [1]		Higher education [2]	
	age	%	age	%
Belgium	15-18	83,4	18-25	29,0
Denmark	16-19	102,4	19-26	32,6
Germany	16-19	117,8	19-26	28,2
Greece	15-18	93,9	18-25	28,5
Spain	14-18	120,5	18-25	32,2
France	15-18	111,8	18-25	35,1
Ireland	15-18	129,3	17-24	27,9
Italy	14-19	79,7	19-26	28,3
Luxembourg	15-19	65,1	19-22	6,7
Netherlands	15-18	136,6	18-25	33,3
Portugal	15-18	76,8	18-26	15,2
GB	14-18	166,6	18-25	28,3

[1] ISCED 3

[2] ISCED 5, 6, 7

Source: BMBF, Grund- und Strukturdaten 1996/97

Table 6 gives the figures for attendance of secondary level II and in the tertiary level in the regions of the European Union (EU 12) in 1993. In this case the number of people undergoing training is related to the overall population of relevant age groups. The secondary level II includes initial vocational training, the tertiary level includes further vocational training particularly in specialised schools. It would appear that the specification of "population of the same age" does not take correct account of national specificities: shares of over 100% already indicate that many of the people are older or also younger.

6.5 Employment prospects

The improved employment prospects of the younger generation will counteract the ongoing labour saving technical developments. Prognos estimates that most European Union Member States will be able to increase their GDP up to the year 2000 by 2 to 3% per annum as was the case in the past decade (Table 7). This will go hand in hand with an increase in productivity (work productivity per employee) of around 1.5 to 2.5%. Of course, this will differ considerably between the individual commercial sectors. Above-average increases in employment are expected in social and personal services (1.3), banking and insurance (0.8), public authorities (0.4) and in transport, communication, the wholesale and retail trade (0.3).

Table 7:

Annual growth in EU Member States 1995-2000 and 2000-2005

	GDP		Productivity		Employment	
	1995-2000	2000-2005	1995-2000	2000-2005	1995-2000	2000-2005
Belgium	2,0	2,3	1,7	1,9	0,3	0,4
Denmark	2,3	2,4	2,7	2,5	-0,3	-0,2
Finland	2,7	2,6	2,3	2,3	0,4	0,3
France	2,0	2,2	1,8	1,9	0,2	0,3
Germany	2,0	2,1	2,4	2,2	-0,3	-0,1
Greece	2,0	2,3	1,6	1,9	0,3	0,4
Ireland	3,9	2,8	2,9	2,0	1,0	0,8
Italy	2,0	2,3	2,0	2,1	-0,0	0,2
Luxembourg	2,5	2,4	1,7	1,6	0,8	0,8
Netherlands	2,2	2,4	1,4	1,5	0,8	0,8
Austria	2,0	2,2	1,7	1,7	0,4	0,5
Portugal	2,7	2,8	2,0	2,0	0,7	0,8
Spain	2,5	2,8	1,9	2,0	0,6	0,8
Sweden	2,0	2,1	2,3	2,5	-0,3	-0,3
GB	2,5	2,4	2,0	2,1	0,4	-0,2
EU	2,3	2,3	2,0	1,8	0,6	0,2

Source: Prognos

Employment will increase on the whole by at most 1% a year: Ireland heads the list, followed by Spain, Portugal, the Netherlands and Luxembourg. For Germany as for Denmark, Sweden and the United Kingdom employment is expected to drop by around 0.3 to 0.1% a year. Hence, efforts to secure unemployment and to bring about a sustainable improvement in employment prospects will continue to be major problems in most countries of the European Union.

Dutch demographers identified the following future paths (Beer, Roodenburg 1997):

If in economic policy terms the market mechanism is allowed to operate and if technical developments and internationalisation are promoted, the scenario called "global competition", then there will be high growth (3.25% a year) and a high demand for labour. The working population will increase and the shortage of labour will lead to employers having to make more concessions about reconciling an occupation with family life. The increases in salaries and also the increase in wage differences will encourage participation in training or force people to obtain more qualifications.

If the market mechanisms and European coordination do not become established (scenario "divided Europe"), then only slight economic growth is to be expected (1.5% a year). Nor will there be any positive effects on the labour market. It will become more difficult to enter the world of work, income expectations and the incentives to obtain more qualifications for working life in school will be reduced.

If more emphasis is given to solidarity and social coherence (scenario "European coordination"), innovations will be introduced more slowly than under the conditions of global competition. Economic growth will be lower (2.75%) and there will be less demand for labour. On the whole, we scarcely expect an increase in the working population even if the socio-political goals of this scenario would mean that employment of women and immigrants would be promoted. The assumed high level of migration will have a negative effect on average participation in education given the low level of education of immigrants as a whole.

These scenarios, which were developed for the Netherlands, can be applied at least to the established industrialised countries of the European Union which continue to be the favoured destinations for immigrants.

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EMPLOYMENT STRUCTURES AND LABOUR MARKET ASPECTS RELATED TO VET

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1. INTRODUCTION

The inter-relationships between a nation's economy and the quality of its workforce are of great importance to social and political commentators, and have become increasingly so in the latter half of the twentieth century. In the past two decades the European member states have been placing more and more emphasis on vocational education and training (VET), as a response to the problems of unemployment and changing skill requirements in the workplace. Given perfect markets, economic theory may indicate that, as trade barriers fall and international competition increases, so labour skills should converge across countries. However, from country to country widespread market imperfections may be observed, preventing labour markets from generating efficient levels of output in vocational skills. The convergence of skill supplies across countries then depends upon that of public policy; however, there continue to be significant disparities in the skill levels found in the workforces of the world. A great variety of vocational education and training structures are to be found in the world's economies, and they continue to exist and develop along different paths, despite claims that VET policy in some countries may be shown to generate more efficient outcomes than in others. The reasons for the persistence of this international diversity may be institutional, political or cultural in nature, relating to the labour market structure of economies or the long-term history of nations' economic bases (for example whether they were first- or second-wave industrialised nations - see Ashton and Green, 1996). In many cases VET structure can be the result of extensive government policy towards a particular economic goal, a situation which has existed in the Newly Industrialised Economies (NIEs) of Asia. However, the success of one country in pursuing a particular path of skills accumulation does not necessarily imply that this route would prove optimal for another nation, as the labour market structure of an established economy may not be radically restructured without considerable resistance, on both the supply and demand sides of the market.

In recent times the global labour market has undergone changes in skill requirements on the demand side. Technological advance has placed new skill requirements on the workforces of developed countries: an ever-increasing level of automation in factories may not only reduce the demand for low- and semi-skilled workers, but also places a requirement on the workforce to have increased levels of expertise in the operating of machinery. On average, the effect of technological advancement is to increase the level of skill required of the workforce[1]. In addition to this the amount of exposure to computers and related equipment that many workers are required to have is increasing all the time. The proficient use of modern technology is also of importance as we consider the move towards an information- and service-oriented society. In order for the supply of labour to respond to these changes in demand, it is necessary to have in place a suitable education and training framework to ensure that the labour force can adapt to the requirements of a changing market. Nations which are not well equipped to deal with these changes are liable to find themselves losing their competitive edge in the global marketplace.

At the level of the individual worker or firm, these issues also have great relevance: a lack of suitably qualified workers in an industry leads to long term decline in employment and output in that industry. Training policy can reduce unemployment in different ways - by subsidising the costs of training, firms are prepared to take on trainees who otherwise may not have been employed. However, the implementation of training which leads to the acquisition of marketable work skills will have long-term effects on unemployment and output, by creating a workforce with a skills profile which matches the requirements of industry. Clearly the second of these should be seen as the desirable objective; the provision of training subsidies with insufficient regard to the ex-post outcome of the spell of training is a dangerously short-term policy, which is open to abuse by employers, who can take advantage of the subsidies to employ cheap labour for low-skill tasks, with scant regard to the vocational development of trainees.

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[1] This result is generally held to be true for the *average* worker. However, it should be interpreted with caution, as the general picture may obscure significant details; for some jobs (e.g. Fleet Street newspaper printers) advances in technology can bring about a process of *de*skilling in labour requirements. Braverman (1974) develops arguments for the deskilling effects of technology for low and semi-skilled workers, and shows that technological advances can also change the definition of skills.

The remainder of this chapter is set out as follows: in section A we set out the basic economic theory behind vocational education and training - primarily that of human capital - and discuss the potential problems which this theory identifies; in section B we look at how economies are able to provide training, despite the potential barriers to efficient provision described in section A. We describe how different systems are used by the countries in Europe to provide vocational education and training today, and discuss the aspects of these countries' labour market structures which are pertinent to the sustainability of the different training policies; in section C we examine recent research results for European countries into the areas described above, and look at the strengths and weaknesses of different systems of VET provision in the light of research findings; finally in section D we summarise and draw conclusions from the research findings, and discuss their implications for current and future training policy.

2. THE ECONOMICS OF TRAINING

The economics of education and training was first given a solid theoretical framework for analysis by Becker in his 1964 book Human Capital, although earlier economists had previously identified the value of education and training as tools in aiding economic growth. The theory of Human Capital gives labour a status alongside that of physical capital as an input of a productive system. The difference between the two types of capital is that in the absence of slavery human capital, unlike plant and machinery, cannot be sold by an employer, but is instead owned by the worker.

Becker identified two types of vocational training - general and specific. Perfectly general training increases the value of human capital by the same amount to all firms i.e. a worker receiving perfectly general training gains skills which are equally useful to all firms in an industry or economy, for example a junior doctor's internship. The opposite of this is perfectly specific training, which has no value to any firm other than that providing the training, for example training a worker to operate a computer system custom-designed for that firm. In reality however, much training is likely to be a mixture of general and specific.

In a labour market with more than one employer, the provision of general training may run into problems because of the fact that it is the worker, not the employer, who has property rights over the training investment. The purpose of training is to increase a worker's marginal product; however, in a competitive labour market wage rates are set equal to the marginal product of the worker. Since perfectly general training increases the worker's value equally to all firms, the training firm must pay the worker the full value of his marginal product, or face the risk of poaching - another firm in the industry can pay the worker full market value for his or her labour, without having to pay for the training. Under these circumstances economic logic dictates that the worker should bear all of the costs of general training, since he or she gains all of the benefits from it. Likewise, in competitive markets, no rational firm would be prepared to bear the costs of general training, as they receive none of the benefits of the worker's increased productivity.

For perfectly specific training, a reverse argument can be applied: the training increases the worker's productivity only in the training firm, and thus the wage he or she can command elsewhere does not increase as a result of the training. The benefits of perfectly specific training are then shared by the training firm and the trainee, according to the need to give each party an incentive to continue their employment relationship after training.

In view of the possibility of employee turnover, Becker concludes that the costs and benefits of specific training will be shared between employer and employee, not borne fully by the employer, so that each has some protection against turnover-inducing decisions by the other. In practice this can be translated into wage growth through company-specific expertise, gained through training or experience. This has since been developed into a theory of optimal wage-seniority growth by Hashimoto (1981), inter alia. Perfect information amongst workers and employers should lead to an efficient level of both general and specific training: workers decide to invest in general training, and both parties in specific training, only if the benefits of training are greater than the costs. However, a number of factors can prevent this from being the case. The first of these is the fact that, as mentioned above, training is in reality neither perfectly general nor perfectly specific, but tends to increase a worker's marginal product by different amounts in different firms. In such cases, insufficient training takes place, as the employers fear poaching by other employers while the trainee is reluctant to pay for a skill for which competition is limited. (Stevens, 1994).

In recent times, human capital theory has come under closer scrutiny, specifically in the context of imperfect information in the labour market. Credentialist and screening theories (Blaug, 1985) suggest that initial training is not so much an investment which can increase human capital, but rather that success in training (as defined by certification), can act as a means of disclosing hidden information as to workers' potential. However, Blaug identifies different versions of credentialist theory; a weak version of this is not incompatible with human capital theory.

Faced with these labour market imperfections, an argument for state intervention in the provision of training can be put forward, since training is generally held to be important for economic growth but, for various reasons, may not be fully provided by the private sector. If it is seen that individuals and firms are unable or unwilling to provide the necessary investment in training, the public sector may be able to provide assistance, in various ways. Firstly direct provision may be possible, in schools and colleges. However, this is likely to be able to provide only general training; certain vocational skills can only be taught effectively on-the-job by employers. State subsidies and controls can be used to induce firms to provide this training to workers if the market fails to generate the desired levels of training. This may appear to be the logical course of action; there is no incentive for firms to pay for training for broad transferable skills on which they have no subsequent claim, and so it makes sense for a body independent of individual firms' requirements to provide this type of training. On the other hand, there is a clear incentive for firms to train workers well in non-transferable skills, since these skills are only of use in the firm which provides them and usually they can only be provided in the workplace.

3. VET SYSTEMS IN THE EUROPEAN MEMBER STATES

The disparity between different countries' VET systems can be broken down in various ways: by different levels of public and private provision, by different levels of skills accumulation (Ashton/Green, 1996) or by focus on internal or occupational labour markets. The third of these distinctions bears broad comparison with the difference between general and specific training: occupational markets encourage labour mobility, usually through a series of vocational qualifications recognised throughout an industry. Job security is not of primary importance, in the sense that qualifications make workers equally employable to all firms.

Internal markets, on the other hand, focus upon a non-mobile workforce who receive on-the-job training, with at best a minor role for qualifications. In internal markets, job security and career advancement are gained through specific training resulting in workers having some hold over their employers, in terms of their knowledge about the specific workings of the training firm over and above that of other workers not previously employed and trained within the firm. Equally, workers have little incentive to leave and seek employment in the occupational marketplace, as they can generally command a higher wage, and have better promotion prospects, within the training firm.

A third type of labour market may also be identified - the secondary labour market, in which pay and skill requirements are low, and thus training is of little or no importance, and consequently there is little job security in the industry. An example of this might be the market for casual labour in the service industries.

Again, we find that in practice labour market structures within countries tend to be a mixture of the types described above. However, there is a tendency to label countries as having either an occupational or internal labour market structure, depending on which system is the dominant one. In this section we outline the labour market structures and VET policies in different

European countries, according to the distinctions described above. Although for reasons of space and ease of exposition we do not present a comprehensive description of the VET systems in all member states, the countries we have chosen exemplify the variety of different systems and labour market structures which exist.

Note also that we focus upon initial training, which we would consider to be of primary importance in this context. In most countries, further training (i.e. that of established employees) is largely unregulated and left to the discretion of individual employers, according to their internal requirements. High quality continuing training, although clearly an important influence on the economic performance of firms and nations, is most profitable for employees who have already been trained in broad transferable skills - those provided at the initial stage. It is therefore initial training which holds primary importance in building a solid skill base for firms, industries and economies, with further training building upon basic skills and abilities learned previously.

3.1 United Kingdom

The traditional British system of training, until the 1970's, was one of apprenticeship, with apprentices "serving their time", training with one employer for four or more years. However, even at its peak the British apprenticeship system had a low participation rate in relation to regular employment or full-time education. In 1964 apprentices made up 3 percent of all British manufacturing employees; this had fallen to 1.2 percent by 1986 (Marsden/Ryan (1991)). Traditionally these apprenticeships, although widely recognised, did not require any form of assessment before completion. From 1964 onwards the Industrial Training Boards (ITBs) were set up to monitor the training which companies provided to apprentices, with powers to award grants to companies providing high quality training, or impose levies on those which failed to meet standards or did not provide training at all. In this way the ITBs aimed to ensure industry-wide provision of training, with penalties imposed on firms which relied on poaching to obtain higher-skilled workers, and did not train workers themselves (the free rider problem).

In 1973 the British government set up the Manpower Services Commission, which had the intention of uniting parties with an interest in training - the government, employers, the unions and the training boards, to create a more integrated approach to training in the UK. A major achievement of this initiative was the setting up of the Youth Opportunities Programme in 1978, which provided the opportunity of vocational training to all school leavers who could not find employment. In the following year the new Conservative Government, in response to rising youth unemployment, introduced a series of youth training initiatives, under which youth trainees were paid a training allowance set by government. This allowance was less than market wages, although participating firms were free to increase this if they choose to do so. Under successive schemes the costs of training have been shared between employers, who pay the level of the training allowance, and trainees, who "pay" through lower-than-market wages. However, the formal training aspect of these schemes was in many cases limited, leading to various ongoing reforms, designed to ensure that youth training would mean just that, rather than allow employers to use youth training subsidies as a method of hiring low-skilled labour at cheap rates. This stems from the fact that the initial focus of these schemes, in the late 1970s and early 1980s, was to provide a solution to the problem of growing youth unemployment. Initially, little attention was paid to the quality of vocational training provided, although from the latter part of the 1980s it was given more emphasis. The growth in uptake of government supported training schemes was pronounced in the 1980s, rising to almost 25 percent of the age cohort in 1986[2].

Britain's educational system was reformed in the mid-1980's, with a view to creating a new structure of vocational courses and certificates. This has resulted in the 1990s in the creation of General National Vocational Qualifications (GNVQs) which are obtainable at schools and colleges of further education, and which are intended to have "parity of esteem" with more traditional academic courses. Since Britain's system of education entitles school-leavers between the ages of 16 and 18 to no-fee education, this form of vocational education is freely available to all who choose to participate, regardless of whether or not it is taken in conjunction with on-the-job training. This is in contrast with the German "dual" system, where the two go hand in hand. The figures show a decline in the take-up of government supported training, and a marked increase in the proportion of the 16-18 year old cohort in full-time education since the mid-1980s: by 1994/95 65 percent of the cohort were in full time education, with less than 10 percent on Youth Training[3].

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[2] Source: DfEE Statistical Bulletin (figures cover England and Wales only)

Since the inception of the Youth Training Scheme in 1983, there has been some tendency to run apprenticeships within the scheme as a way of funding them, although service in an apprenticeship entails a wage set by the employer. For a time, Youth Training was seen as a system to replace apprenticeship, which has high wages in comparison. However, in recent years the launch of Modern Apprenticeships has moved some way to reversing the decline in the number of apprenticeships. Furthermore, whilst until recently it was possible to complete some apprenticeships just by "serving time" at a company, completion of a Modern Apprenticeship is now dependent upon attaining NVQ level 3. Similarly, under the current Youth Credits system, school-leavers can now use vouchers to "buy" their choice of training from whomsoever they choose, to obtain a minimum of NVQ level 2.

The focus of the UK's VET policies has been market-based training (Ryan 1996). Private training is achieved by employers and employees making choices within a training market. Government funds are obtained by Training and Enterprise Councils (TECs) who distribute these funds via training contracts to competing training firms. Similarly the Youth Credits system is designed to allow young people more choice in their vocational training. NVQ attainment is generally the yardstick by which training success or failure is measured. This measures work-related competence, as opposed to the time-serving measure which characterised the old apprenticeship scheme.

In addition to this, further measures to attain a VET market equilibrium are in effect, in the shape of low (relative) trainee pay and job protection. Intermediary bodies such as the Manpower Services Commission have been abolished or their roles been marginalised, being seen as obstacles to an efficient *market* solution.

3.2 Germany

The system of apprenticeship has been important in German labour markets since well before industrialisation, and so it has a well-established place in the country's social background, as well as contributing to its economic development. The German system of VET is also known as the Dual System, because apprentices receive both company training and general and vocational education in a co-ordinated form, the latter being provided by publicly-run vocational schools, through a system of day release. A large share of company training takes place within company training facilities, or in training centres used by several small companies. The standard of training for German apprentices is carefully monitored and legally enforced, with external examinations (both theoretical and practical) a requirement for completion, after an apprenticeship lasting between two and three and a half years, depending upon occupation.

The principles of the Dual System have been in place for some years, although as late as the 1960s it was comparatively unregulated. Since then the system has been the subject of increasing elaboration, in refining what has become a solid national institution. Participating in the system's regulation are local and national employer groups, local and federal government, and the trade unions. All of these bodies work together to develop, modify and monitor apprenticeships, with the result that changes in skill requirements can be communicated more efficiently to those providing the training. The fact that the Dual System has remained stable for so long means that parents can more accurately advise their children about the opportunities offered by taking an apprenticeship. To some extent this alleviates the problems of young people having imperfect information as to the returns to training.

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[3] Source: DfEE Statistical Bulletin (figures cover England and Wales only).

The costs of training are shared by the three parties involved: apprentices, who accept lower-than-market wages whilst in training - approximately one third of market wages (Steedman 1993) - companies, who bear all of the costs of in-house training, and regional government, which pays for the educational side of the training.

Throughout the country and across industries there is widespread participation in apprenticeship: over 60 percent of each school-leaving cohort enter apprenticeship and 70 percent of workers are in companies who train their employees (Soskice 1994). This demonstrates the high regard in which apprenticeships are held, both by young people and by employers who wish to have well-qualified workers. The incentives to young people to take up an apprenticeship extend beyond just a well-established tradition. The opportunity of taking an apprenticeship is available only to the young (those between the ages of 16 and 25), and it is also the only route through which young people can obtain free education past the age of 18, regardless of previous academic achievement. Furthermore, it is only possible to set up a business or practice in many trades, such as motor mechanics, if one has already completed an apprenticeship and obtained a Meister certificate.

Although a sizeable proportion of German youth training takes place within companies, the end result is that the training is more of an occupational nature, with qualifying apprentices obtaining skills which are transferable between companies in an industry. However, this mobility does not transfer into a high turnover in the workforce (Soskice 1994); German companies, having trained their apprentices, seek to retain them (or at least the best ones) upon qualification, having invested time and money on their training. Thus the German labour market has a well developed internal structure, as well as an occupational one. Qualified workers have job security, but also a high level of marketability if they do happen to lose their jobs, thus an apprenticeship acts as an insurance policy against job market uncertainty.

3.3 France

As with Germany, France has increasingly attained a high level of VET provision. However, it is achieved through a very different system. Although the apprenticeship system is important in the artisan sector, this is the only sector where initial work-based training is at all widespread. Furthermore, the French apprenticeship system involves a high degree of employer autonomy, with a system of levies and grants used as an inducement for employers to provide apprenticeships. In total apprentices account for around a quarter of youth vocational training (Kirsch 1994).

Whereas in Germany the “dual” route to vocational qualification involves a high level of employer participation, the regulation and most of the provision of VET in France (other than for apprentices) is the responsibility of the government, who provide vocational education through full-time schooling.

Post-compulsory education in France may proceed along one of three routes: general/academic, broad vocational and narrow vocational courses. However, in all vocational courses general/academic elements are included, in particular focusing on mathematics. There exists a well-defined framework of qualifications and certification: for both the general/academic and broad vocational routes the aim is to obtain a baccalauréat qualification. In contrast the narrow vocational route does not generally lead to the baccalauréat, rather it is seen as a pathway to employment through study of specialist craft courses (CAPs).

The French emphasis on school-based VET provision inevitably carries with it the potential of a lack of communication of skill requirements from employers to educators. Since 1972 this has been sought to be resolved through the existence of occupational commissions. These provide consultation between employers, employees and government representatives on a national level. This allows employers to have some say in the content and nature of initial vocational training and qualifications, although they have no hand in the actual provision.

The French system of publicly-provided vocational education enjoys a high rate of participation, reflecting a tradition of government commitment to collective arrangements. This is particularly important for the French economy - given the organisational weakness of both employers and unions (Ryan, 1996) taking the problems of training away from the open market and into the hands of the state ensures at least that vocational training will be provided. Public participation in post-compulsory education is also high; in 1991 some 76 percent of the total 16 - 19 year-old cohort were participants in education OECD (1994). Although the majority of participants were enrolled in the general/academic route, numbers taking the broad vocational route have increased, to the detriment of the narrow vocational courses - in 1992/93 27 percent of the age cohort were enrolled in the narrow vocational route. This is in part due to the creation in 1985 of the baccalauréat professionel (BP) - formally on a par with the traditional academic baccalauréat but now a required qualification for many areas where formerly CAPs were the recognised qualification route.

The dominant labour market structure in France is the internal market; employers use internal promotion extensively and, as a result, youth unemployment is high (in comparison with Germany, for example). Thus the provision of a high level of publicly-provided vocational education is a tool used by the government as a counter to the predominance of specific training provided by companies for existing employees.

3.4 Norway

Norway has a standardised educational system, the compulsory section of which is usually completed by the age of 16. From then on the choice is given to potential school-leavers of three years of continuing education. Until 1994 the choice was either to enrol in general education, in order to prepare for higher education, or to enrol in study for a vocational qualification. Vocational education was pursued along one of two paths: full-time study, or through day release for a young person with an apprenticeship. Apprenticeship in Norway involved a contract (usually over three or four years) obligating employers to provide quality training and apprentices to make full use of the training, with the aim of obtaining a certificate of qualification. However, although the Norwegian apprentice system was in this sense well-developed, participation in apprenticeship was not widespread - in 1990 approximately 12 percent of the relevant cohort had apprenticeship contracts, which were confined mainly to the craft and industry sectors (Elias et al 1994). Moreover, an apprenticeship may only be obtained after at least a year in vocational schooling.

For other sectors of the economy, young people obtained vocational qualifications through full-time schooling. Public vocational education involved industry specific lessons - for example students taking commercial studies (the most popular vocational course) worked with computers and performed office tasks, and auto mechanic students gained practical experience within school premises. At the end of each year vocational students obtained certificates, and so it was common for vocational students not to complete a full three years of post-compulsory study. However, initial enrolment in vocational courses was high - in 1988, 55 percent of the cohort entered vocational schooling, compared with 35 percent entering general education.

The education and training of young people between 16 and 19 years of age was reformed in 1994. The reform gave all young people a statutory right to a three year full-time education. The purposes of the reform were to achieve a more uniform education and reduce specialisation, especially in the first year of upper secondary education, and to achieve better co-ordination between education in school and at work. The number of separate foundation courses was reduced to thirteen. The main model for vocational training is the 2+ model; the first two years are spent in school followed by one year of apprenticeship training or two years of apprenticeship training combined with productive work in business and industry. If a sufficient number of apprenticeship places cannot be obtained, county municipalities must offer the trainees the opportunity of completing their training at school. The final vocational examinations taken by trainees are the same for trainees who have had apprenticeships and those who have been trained at schools.

Thus Norway, like France, solved the potential problem of inadequate private provision of vocational training by providing almost all training in the public sector. This has the effect that the training is necessarily of a relatively general nature. However, in addition to apprenticeships there are also opportunities for students in vocational education to gain employment experience through placements between school years. In this way Norway, although far from operating a Dual System as in Germany, maintains some links between public provision of vocational education and private sector training.

3.5 Other countries

The systems in place in the four countries described above exemplify the variety that can be found in the provision of VET in Europe today. Other countries' VET systems can often be broadly likened to those outlined here: Austria and Denmark have extensive apprenticeship systems similar to the one found in Germany; Italy has a system of extensive secondary upper education as found in France; many institutional similarities may be found between Sweden and Norway. Norway is also interesting because in Norway oil revenues have released the public expenditure constraints which apply in other EU countries.

Although the focus of this study is on systems of VET provision currently in place in European economies, there are other economies in the world with markedly different training agendas. Japan, for example, has a system of vocational training unlike any of those described above. The Japanese labour market is extensively internal, with emphasis in larger firms on jobs-for-life and internal promotion. Intensive in-company training is provided by such firms for workers with a high level of general education. The presence of Japanese firms in Britain (and also in the US) has had major effects in several sectors. In particular in the automobile industry Japanese training practices have proved highly effective, and have induced some degree of imitation.

It should be noted, however, that despite the variety of VET systems which may be found in Europe today, apprenticeship is to be found in most countries. Although the implementation varies widely, ranging from the extensive Dual System in Germany to the largely artisanal systems in place in France and Italy, the historical and present day importance of apprenticeship must be recognised. The coverage of apprenticeship schemes varies from as high as 66% of the relevant youth cohort in Germany, to as low as 4% in Greece (CEDEFOP 1995).

4. COMPARATIVE SUCCESS AND FAILURE OF THE MAJOR EUROPEAN TRAINING "IDEALS"

In essence the European discussion can be broken down to comparisons between the Dual System found in Germany, the educationalist system typified in France, and the UK's market-based system[4]. These three countries correspond to "ideal types", benchmarks against which the VET systems of other European countries can be compared.

Assessment of the relative success or failure of different training systems may be measured in various ways. The most direct of these is the resulting skills profile of the workforce, in particular that section of the workforce exposed to the training (primarily the youth cohort past the age of compulsory schooling). Other measures of training success relate to employment prospects and wages of trained labour force participants, relative to those without training.

In this section we look at some recent research results for these "ideal type" countries, with a view to highlighting some of the pros and cons of the different systems revealed by this research. A relatively large body of research literature examines the skill profiles and employment prospects in France, Germany and the UK, compared to other European countries. Nevertheless, when examining the results of research it is necessary to bear in mind the differing labour market structures which exist in these three countries, and any conclusions drawn must take into account the specific aims of each country. Each have different problems to address, and the VET systems in each country seek to tackle specific institutional barriers to achieving national training targets. France has a high level of public VET provision due in part to the inadequacy of collective organisation of employers and workers, and also to the historically high levels of youth unemployment in France. The UK, in a continually evolving training market, is addressing problems of low regard for initial vocational training, by creating public policy to facilitate efficient market provision of training. The problem of youth unemployment, whilst still an important consideration, has been overshadowed by the need to bring about an upskilling of the workforce, which can in itself reduce unemployment in the long run. Germany, on the other hand, currently has a high proportion of its workforce with intermediate skills, a situation which has been relatively stable over recent years, and so the country's considerations might be more towards fine-tuning a well-established system towards achieving an efficient balance between the routes of vocational training and academic education.

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[4] Norway's VET system is in many ways comparable to that of France; for reasons of brevity and availability of results we concentrate on France hereafter.

4.1 Skills Profiles

Despite the institutional differences between countries, a common goal which all VET systems share is to achieve an efficient distribution between skill levels amongst workers, with a high proportion classed as skilled workers, and a low number of workers with low, or no skills.

At the aggregate level, it is possible to compare directly the achievements of different countries in skilling their workforces, provided a common basis for comparison can be identified. As part of the British government's Skills Audit, Green/Steedman (1997) set out a benchmarking method to allow such comparisons to be made. This is based on qualification levels, and draws on detailed study of curricula in different countries. They distinguish four separate skill levels: degree (high skills), level three (higher intermediate skills), level two (lower intermediate skills) and below level two (low or no skills). Formal definition of these skill levels is set out in Table 1 below:

Table 1: **Definitions of Comparable Skill Levels**[5]

Level	France	Germany	United Kingdom
Degree	All teaching, nursing, BTS/DUT. All first and higher degrees	All Meister and Techniker All first and higher degrees	All teaching, nursing, HNC/HND All first and higher degrees
Level 3	Baccalaureat, BP	Arbitur, Fachhochschulreife All apprenticeship passes (duration 3 or more years)	2 or more A-level passes, GNVQ 3 and equivalent, NVQ 3 or equivalent
Level 2	BEP, Brevet (College series only)	Leaving certificate of the Realschule or equivalent. Apprenticeships of less than 3 years	1 A-level, 5 or more GCSE grades A-C, GNVQ 2 or equivalent, NVQ 2 or equivalent
Below Level 2	CEP, no qualifications	Leaving certificate of the Hauptschule, no qualifications	CSE below Grade 1, GCSE below grade C, no qualifications

Source: Green/Steedman (1997)

Broadly speaking, national targets aim to move more of the workforce from below level two up to the level 3 skill category. In France the target is for 80 percent of young people to reach this skill level, for England and Wales the target is 60 percent of young people by the year 2000.

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[5] Reproduced from Green/Steedman (1997). Original version also includes equivalent definitions for Singapore and the US.

On the basis of these definitions, Green/Steedman make international comparisons of workforce skill levels. In terms of the target of a high proportion of level three skills amongst the young, Germany comes out a clear winner, with around 70 percent of 25 - 28 year olds qualified to this level[6] in 1993. France and England in 1994 both had well under 20 percent qualifying at this level. Similarly, Germany has the lowest proportion of the cohort below level 2 - around 10 percent, compared to around 20 percent in France and 45 percent in the UK. It should be noted, however, that the position of both France and England had both improved considerably from a decade previously, when almost 40 percent of the French cohort and 60 percent in the UK were below level 2 (the figures in Germany showed relatively little change, with a small shift from below level 2 to level 3 qualifications from 1985 - 1993).

At the aggregate level, then, it appears that Britain and France are lagging behind Germany in providing skilled workers[7]. However, an issue equally as important is how well the skills profile in each country matches the requirements of employers. This question is more difficult to answer precisely; information about skill matching can only be accurately gained surveying employers about their skill requirements and the skills of employees and job applicants. However, it is also possible to infer a certain amount from destinations of training graduates and their career progression in the different countries, and to use aggregate statistics to draw some general conclusions.

In Germany, the Dual System of apprenticeship ensures that trainees receive on-the-job training from employers, who tend to retain apprentices upon qualification. The flow of information between employers, employee groups and educators in this system also helps to ensure that the general training apprentices receive at college provides skills which are of use in the workplace. Furthermore, the coverage of the German apprentice system is high - most skilled occupations are represented, not just the artisanal sectors traditionally associated with apprenticeship around the world (although the vast majority of German apprentices are in these sectors - over 50 percent in industry and commerce, and around 34 percent in the crafts (CEDEFOP 1995). Therefore in each sector of the economy there is a guaranteed supply of initial entrants who have qualifications which match the requirements of that sector. Table 2 below shows the high proportion of firms who train apprentices: even for very small firms, where training costs as a proportion of revenues tend to be higher, a significant proportion take on apprentices. Furthermore, the retention rate of apprentices in the training firm is high. This gives an indication of the extent to which the German dual system is successful in providing trainees with a skills profile matching the requirements of the particular labour market.

Table 2: **Retention Rates and Training Rates of German Companies, by Company Size, 1985 Sample Survey**

Number of Employees	Post-apprenticeship Retention Rate of Apprentices (in Training Companies)	Percentage of Companies with Apprentices
5 - 9	0.56	35
10 - 49	0.64	59
50 - 99	0.69	78
100 - 499	0.73	91
500 - 1,000	0.82	99.5
> 1,000	0.87	99.6
All firms	**0.73**	**80**

Reproduced from Soskice (1994)

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[6] This age group is chosen as it is the age by which most initial training should have been completed in all countries studied. However, there are certain caveats to this: in Germany some degrees may not have been completed by this time. Furthermore, this choice of cohort will not pick up the effects of the most recent policy changes, for example in the UK. However, like for like comparison of a younger cohort was not possible.

[7] A further result from Steedman/Green is that both France and the UK have a higher proportion of the cohort than Germany who attain first degree level or higher. However, higher education is not the focus of this report and thus not discussed in detail.

As discussed in section B, the coverage of the British initial training in recent years has been low, at least in comparison with Germany. However, the relatively low degree of regulation ensures that, in principle, any firm can offer government supported training schemes, although their take-up is not guaranteed. As a result, the spread of training across sectors is fairly wide. However, a large proportion of youth training has been in relatively low-skill areas: the most common YTS placement in 1990 was in administrative and clerical work, making up 18.8 percent of all places. A further 16.2 percent of placements were in construction and civil engineering (Dolton et al, 1994). Although there is potential for training in skilled tasks in these jobs, there is also a clear incentive for firms to use trainees to perform relatively undemanding tasks such as filing and unskilled manual labour.

The results of initial training in Britain, in terms of employment prospects, are strikingly different from those in Germany. Table 3 below shows the destinations of YTS leavers from 1985 to 1989. The figures suggest that YTS had a comparatively weak effect on employment prospects: in 1985/86 only approximately half of those leaving YTS schemes found regular employment. This figure rose steadily throughout the 1980s, but by 1989/90 some 39 percent of YTS leavers were still not proceeding to permanent employment, either in or out of the training company[8]. Looking at retention rates, it can be seen that these are significantly lower than those for German apprentices. Comparing figures for 1985, just over a quarter of YTS leavers were kept on at the training firm, compared with three quarters of qualifying apprentices in Germany. Although this figure had improved to around a third by 1989/90, it is still low enough to provide clear indication that training under the largely unregulated YTS system did not forge particularly strong links between employers and trainees. Either training was of a low enough quality for training firms not to want to continue employment of their former trainees, or the experience gained by trainees within the training firms dissuaded them from seeking permanent employment therein. Although these figures do not capture the large variation in retention rates between sectors - in transport operating the retention rate was 55 percent in 1989/90 (Dolton et al. 1994) - they are an indication of the low level of specific training provided. This reflects the fact that British labour markets have predominantly been occupational. The links between occupational and internal markets inherent in the German dual system are weaker in Britain, and as a result the simultaneous provision of general and specific skills is restricted in a training market with little regulation.

Table 3:

Destinations of YTS leavers between 1985/86 and 1989/90

Year of YTS completion	Employed with same employer	Employed with different employer	Unemployed	Further YTS	Overall unemployment rate (%) amongst 18-20 year olds
1985/86	27.5	25.2	27.9	6.5	23.4
1986/87	27.6	28.8	22.7	10.6	20.2
1987/88	22.6	32.8	20.6	11.9	16.1
1988/89	32.5	29.4	14.0	12.0	11.9
1989/90	33.5	27.6	14.0	10.7	9.8

Reproduced from Dolton et al (1994)

We now look at the impact of the other component of the British system - publicly provided vocational education (although, as stated previously, this also now exists within a quasi-market framework). The increasing integration of recognised vocational qualifications (NVQs and GNVQs) into Britain's VET system gives a benchmark by which initial training can be assessed. However, Robinson (1997) attacks the specific claim that these qualifications have "parity of esteem" with recognised academic qualifications. Using data from the Labour Force Survey,

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[8] The figures in table 3 do not include a residual category, which includes those who were self-employed, as well as those in part time employment and those who did not respond.

Robinson compares the employment patterns of those holding vocational qualifications with those holding academic ones. He finds that, on average, the employment earnings of those holding vocational qualifications are on a par with workers with academic qualifications one level lower. In other words, the vocational route leads to lower wages than a notionally equivalent academic path. In addition, Robinson finds that access to managerial and professional occupations is easier for those holding academic qualifications, with those holding vocational qualifications tending to end up in technical and craft occupations which pay less well. Furthermore, for employees in the professional occupations and/or in managerial positions, average income for those with academic qualifications exceeds that for those trained on a notionally equivalent vocational route.

These findings present problems for vocational educators in Britain, namely that the vocational route, even now it is becoming increasingly integrated with employment experience, is still seen by many employers as an inferior substitute to academic education. This puts the vocational education route firmly in the second choice position in the eyes of people of school-leaving age, with the vocational courses a rational option only for those with a relatively poor academic record. This contrasts sharply with Germany, where apprenticeships are highly valued and young people strive to attain high academic performance so as to gain a better apprenticeship.

In France the problems of providing a workforce with an efficient skills profile are in some ways similar to those in the UK. As in the UK, the value of vocational education is popularly seen to be substantially less than the academic route. However, the reasons for this have their roots deep in the social history of the country (d'Iribarne/d'Iribarne 1993). Educational achievement defines and allocates social status, and so the issue of initial training is not solely an economic one, but also a matter of prestige for young people. The creation of the vocational BP certificate has gone some way towards making vocational education a more attractive option for young people, by placing it, at least formally, on an equal footing with a respected academic course. However, the problems in France relate largely to what happens after initial training has been completed.

The predominance of internal markets in French labour market structure presents considerable barriers to the transition from initial training to full-time employment, a problem which is reflected in France's rate of youth unemployment. Although French companies do participate in training schemes, the bulk of their training expenditure is concentrated on continuing training - firm-specific training programmes designed for career progression and the adaptation of workers' skills to meet changing requirements.

The task of providing a bridge to employment for those with general training but little or no labour market experience is addressed though the provision of various public job entry programmes, which were created in the early 1980s. These "transit zone" measures mainly take the form of some type of contract short of a permanent employment contract and include, inter alia, skilling, adaptation and orientation contracts. Amongst these, a further distinction may be drawn between market measures, which focus on leading directly to permanent private sector employment, and non-market measures, such as job creation in the public sector, which are more directly aimed at alleviating youth unemployment. Romani/Werquin (1995) discuss the relative success of these measures in bringing school leavers into the labour market. They identify the two patterns of behaviour amongst those wishing to gain employment: some who take part in public job-entry measures through lack of choice - because they cannot find permanent employment in the open labour market. Others can choose whether or not to avail themselves of these labour market measures. Yet others regard these programmes as unrewarding, for various reasons: low relative wages, low quality training, or a negative labour market signal to employers. In some respects these "transit zone" measures bear resemblance to British initial training - notably Youth Training, which has been criticised for low quality.

Nevertheless, French public job-entry programmes have had high take-up: between 1989 and 1992 some 57 percent of the youth cohort availed themselves of one or more of these programmes (Romani/Werquin 1995). Amongst these young people, those who do achieve entry to regular employment after participation on one or two programmes have higher skill profiles - similar to those who achieve employment without recourse to the "transit zone" measures. For those with lower skills, participation in several programmes without subsequently gaining permanent employment is more common. This emphasises the limits to "helping hand" role of these programmes: the people who benefit most are those who already have the best qualifications, whilst for those with worse qualifications the programmes serve at best to keep them in touch with the labour market. In achieving permanent employment, market measures exhibit a greater success rate than do non-market ones, although for less qualified participants one or more spells on non-market programmes beforehand is common.

In all three countries we have reviewed, initial vocational training of one form or another is widely available to the young. However, the rate of participation varies from country to country. This can be explained in terms of human capital, whereby the choice of whether or not to invest in one's own human capital depends upon the relative returns to the various options open to individuals. In Germany the returns to participation in the dual system are clear. Qualified ex-apprentices at large firms gain job security in internal markets, as well as recognised labour market value in the occupational market, in the event of the need to find employment elsewhere. The direct pecuniary benefits are well-known and firmly established: an apprentice's wage increases by a factor of around 3 upon qualification, to the level of a skilled worker.

In contrast to this, expected returns to participation in the French system of public school-to-work programmes described above are much lower, and entry-level wages are often lower for an individual who has participated in a programme, compared with a similarly qualified employee who entered employment directly from school (Romani/Werquin (1995)[9]. However, the returns to participation in school education are well known, and the social desirability of higher qualifications inextricably links economic and social standing to school achievement. Thus the creation of a vocational equivalent to an established academic qualification - the BP and general baccalaureate respectively - has facilitated an expansion of the vocational route, and through this an increase in the rate of skill formation in areas other than general academia.

For the UK, reluctance to invest in human capital has been the result of a combination of factors. Firstly, the relatively low participation rates in government supported training programmes have been largely due to uneven quality and low returns. Without certification, the value of training alone is questionable. Work by Dolton et al (1994), and by O'Higgins (1994), suggest that participation in the YTS programme could have negative effects on wages and employment probability. This suggests that the on-the-job publicly funded youth training system in Britain has been viewed unfavourably by employers. The question of certification has been addressed through the creation of the NVQ and GNVQ qualifications, which contributed towards a rapid expansion of participation rates in post-compulsory education since the mid-1980s. However, Robinson suggests that in this respect also, the vocational route is held in lower regard than academic achievement. Achievement of an upskilling of the population other than through purely academic routes is hampered by the low status accorded to vocational education and training. Thus the problem in Britain, as in France tends to be one of an educational imbalance in favour of the general/academic route and away from the vocational route.

4.2 Apprentice and Youth Wages

As described in section B, a central part of the provision of initial training by employers is that trainees should bear their part of the costs of training. Nevertheless, both employer and the trainee have considerations other than the ultimate returns to the human capital investment, and who reaps these returns. Despite the fact that work-based training is an investment, trainees also produce some level of output, generally less than that of a fully trained worker. Therefore, in a perfectly competitive labour market initial trainees are paid a wage equal to their marginal product. However, the structure of youth and apprentice pay in the EU varies from country to country, reflecting the balance of internal and occupational markets. In the occupationally oriented labour markets of Germany, apprentice pay is low - between one half and one third of full adult wages. In contrast in France, Belgium and Italy, where the internal market is dominant, youth wages are amongst the highest.

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[9] Note that this finding is not universal, and varies across gender and training programme undertaken.

Clearly, high youth wages present an obstacle to both youth employment and vocational training. The youth training programmes in the UK, and the "transit zone" measures in France represent attempts to overcome this obstacle. The limited success of these measures in bridging the gap between vocational training and permanent employment reflects the fact that these schemes have thus far had little legitimacy. Although they may be useful in alleviating youth unemployment in the short term, the ultimate success of any such measures rests on how well they facilitate the school-to-work transition. Achieving this goal is conditional on preventing the possibilities of employers using trainees simply for cheap labour for the duration of the training contract, and by ensuring that participation in training courses is seen by both employers and young people as positive labour market activity (Marsden/Ryan 1991).

As a final note in this section, it is necessary to consider the different economic positions of the three countries when comparing the performance of their VET systems. Although we have used success in the transition from initial training to permanent employment as a point of comparison, it should be noted that the employment prospects of trainees are also dependent upon the health of the labour market in general. Table 4 below shows employment figures for the three countries, for 1986 and 1993. We showed previously that German companies retained a large proportion of apprentices upon qualification, with the UK and France showing less success in the transition from trainee status to permanent employee. However, it is also a fact that the UK and France have had much higher levels of aggregate unemployment than Germany, and so Germany might be expected to have a comparatively high retention rate on this basis alone. But as we noted in the introduction, training has effects on both structural and long-term unemployment, therefore unemployment is endogenous to any system of VET provision. The transition from training to permanent employment is also highly dependent on the dominant structure in the labour market. In practice it becomes virtually impossible to unravel and quantify precisely the effects of training on the labour market, so any comparisons that are made can only give a general picture.

Table 4: **Unemployment figures for Germany, France and the United Kingdom**

	Aggregate unemployment rate		Youth (aged under 25) share of total unemployment	
	1988	1993	1988	1993
Germany	8.1	7.2	23.2	13.2
France	10.7	10.8	37.8	28.0
United Kingdom	12.0	10.4	35.4	30.8

Source: Eurostat (1988, 1995)

5. SUMMARY AND CONCLUSIONS

In our analysis we have sought to examine the relationships between labour market structure and VET provision, and identify the relative strengths and weaknesses of different European systems. By concentrating our comparative analysis on three countries - France, Germany and the United Kingdom - we have focused on three "ideal types" of VET provision - the educationalist, dual and market-based systems respectively - which these three countries represent most closely in Europe today.

Comparing first aspirations for workforce skill levels the focus of VET provision, broadly speaking, is to help raise the proportion of the workforce with intermediate skills - levels 2 and, more importantly, level 3, as defined by Green/Steedman (see Table 1) and lower the proportion of the workforce with low skills - below level 2. On this basis Germany has already achieved a very high success rate; the relatively low level of improvement in the skill profile of Germany's workforce in recent years reflects the limited scope there is for improvement, given that a high proportion German workers already hold intermediate qualifications. In France and the UK, whilst both countries have in recent years seen significant fall in the proportion of the population with below level 2 qualifications, the overall shift in skill profiles has been towards Higher Education - beyond level 3. This emphasises the problem encountered both in France and the UK - that academic qualifications are held in higher esteem than vocational ones. Whilst an upskilling of the population has been proved possible, it has so far proved more difficult to concentrate the skill profile of the workforce amongst the intermediate and higher intermediate levels.

The related problem of linking supply and demand for skills has also been shown to be well addressed by the German Dual System - the close links between educators, employers and employees throughout initial training gives apprentices a direct route into permanent employment upon graduation, with access to both internal and occupational markets. Since German companies undertake a sizeable proportion of initial training themselves (or within closely linked specialised training providers) they are able to provide themselves with access to a supply of job applicants with skills relevant to the job specifications.

In France, the links between supply and demand for certified skills has been hampered by inefficient communications between employers and employees. Although advisory bodies exist to bridge this communication gap, the low level of direct employer-based structured training creates problems of skill mismatch. Furthermore, the highly internal nature of French labour markets raises specific obstacles to finding permanent employment, which the educationalist system does not in itself address. This necessitates the existence of costly public job-entry programmes, which are limited in their scope and minimal in their training content.

The United Kingdom also encounters problems of links between initial vocational certification and subsequent employment. However, the problems here are that the quality of vocational certification is popularly perceived to be lower than for academic qualifications. The most recent changes in vocational preparation have introduced links between work-based training programmes and recognised qualifications, but the system is still in its early stages and requires development. The explicit linkage of training to employer requirements is addressed more directly than in France, but is still some way off the efficient exchange of information present in the Dual System.

In terms of future expansion, we have already observed that Germany may already be close to a desirable high skills equilibrium. In contrast, there is scope for considerable expansion for intermediate skill levels in France and the UK. Of course, this is not to say that Germany's dual system is necessarily superior to either a market based or educationalist system of VET provision. The Dual System has been developing for decades whereas France and the UK have significantly restructured their VET systems relatively recently. A judgement of superiority purely on the basis of current skill levels would be misleading to say the least.

Nevertheless, the Dual System has much to recommend it: in a country where occupational markets are widespread, the system ensures the provision of recognised vocational qualifications to enable employers and job seekers to gauge the value of human capital; at the same time, apprenticeship provides workers with access to internal markets, by forging links with employers from the outset of their initial training, leading to a high retention rate of apprentices upon qualification. In this way the dual system allows a successful integration of occupational and internal markets in industry and commerce.

In France, where the internal market is the dominant structure, and employer and employee organisations are weak, there are clear social incentives for the state to provide widespread access to vocational education. It ensures the provision of a certain level of general skilling of the workforce which internal structures give little incentive for employers to provide. Firm-specific skills can then be provided by firms to their workers within the internal markets.

However, the dichotomy found here gives rise to barriers to initial labour market entry - potential mismatch between general skills learned and those required by employers, and low trainee exposure to work experience. These problems are addressed through the costly provision of further labour market measures. In addition France still encounters obstacles to efficient VET provision, in the form of widespread low regard, dating back to the historical inferiority of the artisan to the artiste.

The UK's market based system has some characteristics of both the dual and educationalist systems. In both the UK and in Germany, occupational labour markets exist alongside internal markets, although in Germany the two are more successfully integrated. Where occupational markets exist, there is a need to provide the workforce with a recognised system of skill certification. However, in the UK this is done primarily through an education system which is as yet largely independent of employer based training. Although this situation is changing, with the onus on employers to give workers initial training leading to recognised qualifications in job-related skills (NVQs), and the development of a series of qualifications in general vocational skills (BTECs and GNVQs) available at educational institutions, this still leaves the market based system with a problem when vocational qualifications are held in lower regard than academic ones by employers. This leads to an uneven weight of investment in favour of the academic path, which bears higher returns, and to underinvestment in vocational skilling, a problem which the UK shares with France.

The problem of low regard for vocational qualifications can lead to a situation whereby underinvestment in vocational skills is self-perpetuating: if employers value general and higher academic qualifications over vocational ones, then they offer an increasingly lower number of apprentice-type training places. This discourages young people from following the vocational route to intermediate qualifications, in favour of obtaining more valuable general educational qualifications. The vicious circle continues, and the economy moves ever further away from the desired balance between vocational and academic skills. Although, as we have described, this situation can be observed in the UK, there are also fears that the problem could be arising even in Germany, where in comparison the vocational route is highly regarded. The issue there is not that the level of skills amongst the young is lacking, but rather that not enough young people are training along the "right" path, and that the country may experience a skill shortage in key vocational areas. In order to achieve and maintain the desired equilibrium between academic and vocational qualifications, it is necessary to establish true "parity of esteem" between the two routes. Once this has been achieved, the labour market will be better equipped to clear, generating an efficient allocation of human resources.

In both France and the UK in recent years there has been an increasing focus on acquiring general skills, for example competence in mathematics, and less on training for narrow, non-transferable skills. This has for a some time been an important part of vocational education in Germany. Soskice (1994) points to the strengths of the German economy in the areas of medium-technology industry and banking as integral to the success of the Dual System. In these areas, competition is high, as is the potential for international pressures. This leads to a requirement for a flexible workforce with general skills suited to changing product specifications, as well as company-specific skills needed to adapt to changing production technology.

In this paper we have established links between aspects of labour market structure and systems and outcomes of VET provision in different countries. Countries may often be classified according to whether they have predominantly occupational or internal labour markets, but in reality most market structures will bear some occupational and some internal features. Germany, although often classed as having an occupational structure, also has well-developed internal markets in larger firms. The difference between Germany and many other countries - in particular France and the UK - is that the two market structures are successfully integrated so as to facilitate an extensive system of vocational education and training which leads directly to employment.

Given the strengths of the German nation in industry and commerce, it has often been inferred that a programme of VET provision such as the Dual System, which leads to a high level of intermediate skills amongst the workforce, has high importance in building and maintaining an economy which can compete in the global marketplace. If we are to make this conclusion, we must consider the system as a whole, rather than regarding only the labour market aspects of VET provision; the dual system has been developed and made part of the institutional structure of the country primarily in the post-war years. Features such as the tripartite co-operation between employers, unions and government and external regulation of curricula and examinations combine with the structure of German labour markets to create conditions conducive to a high intermediate vocational skills output.

In the UK, the Industrial Training Boards (ITBs) and subsequently the MSC went some way towards emulating the conditions under which the Dual System operates. In particular, these bodies were bypartite in nature. As a result the quality of training provided was improved. However, they encountered problems of low employer support: the higher training costs owing to the improvement in quality were not generally offset by lower trainee pay, which was outside the jurisdiction of the ITBs, and as a result the intake of apprentices in industry declined.

On the other side of the coin, the more recent experience of the YTS and related schemes in Britain shows an emphasis on the provision of a broad coverage in work-based initial training, by allowing low trainee pay at a rate similar to that paid to German apprentices. However, the low degree of regulation under the YTS meant that training quality was uneven and largely unenforceable (Marsden/Ryan 1991).

These two examples show some of the problems encountered in the restructuring of VET provision, when only part of a complete system is adopted. Without proper regulation, trainees and training are targets for use by employers for their own profit, rather than in the interests of providing general training in transferable skills. Equally, legislation to ensure high quality without allowances for higher training costs will dissuade employers from providing training. If the aim is for provision of "low pay, high quality, high volume" system, we may look at the paradigm of the Dual System, which achieves this goal through an efficient combination of economic and regulatory measures. The issues of relative trainee pay, regulation and assessment of training, inducements and incentives for employers and young people - these are all part of the same package, and in formulating and evaluating VET policy all must be addressed, in order to reach an efficient output of vocational skills by this route.

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TECHNICAL CHANGE, WORK ORGANISATION AND SKILLS: THEORETICAL BACKGROUND AND IMPLICATIONS FOR EDUCATION AND TRAINING POLICIES

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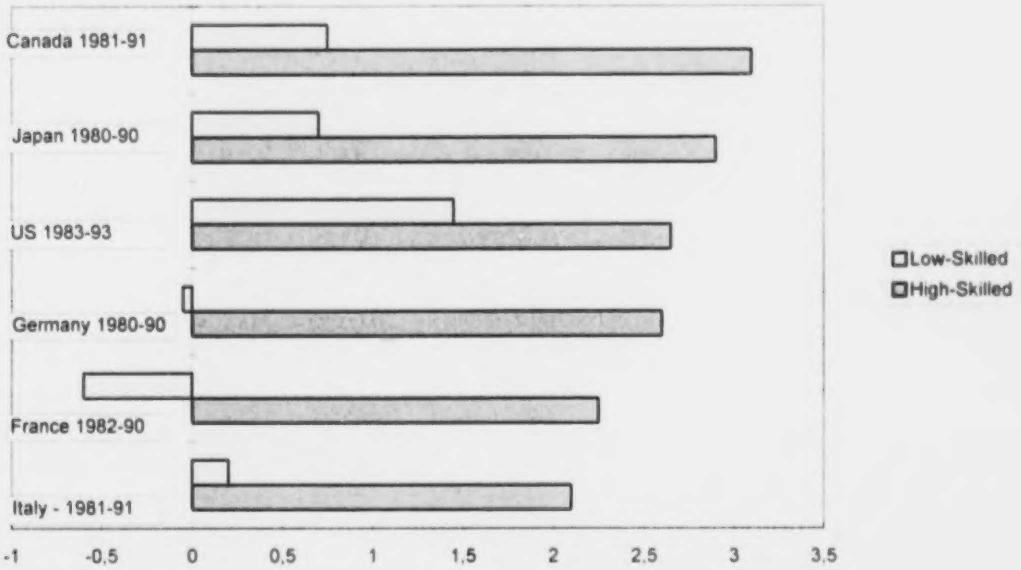
1. INTRODUCTION

For several years now, most industrial economies have experienced an upward shift in their job structure. As shown in Figure 1, the proportion of high skilled jobs has increased tremendously in the 1980s.

Figure 1: **Employment growth of high skilled and low skilled workers**[1]
Average annual growth rates



Source: OECD Secretariat estimations from national data (STI/EAS Division).

Employment has been growing much faster for skilled workers than for unskilled ones reflecting an increase in the *relative demand* for educated workers.

How can OECD economies cope with this rising need for skills? What kind of policies could be devised in order to match the new needs? These are the important questions to be tackled in this report. In order to address those issues, one must first understand the determinants of the current increase in the demand for skills. Analysing the reasons for this rise is essential in order to assess what kind of skills are required and which policies are more likely to enhance them. Two main factors are plausible candidates: technological change, the pace of which has accelerated a great deal in the past 15 years, and organisational change, i.e. changes regarding the organisation of work inside firms.

In a first step, we will analyse the relationships between technology, organisation and skills and show that both technical and organisational change have contributed to raising skill requirements. In a second step, we will build on this analysis to assess what kind of skills are required in the present environment. We will establish that transferable skills are widely needed which will lead us to establish some implications for the shaping of education and training policies.

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[1] "High skilled" workers are defined here as those in the following occupational groups: senior civil servants, senior executives and managers (ISCO-88 Group 1); professionals (ISCO-88 Group 2); technicians and associate professionals (ISCO-88 Group 3). All remaining occupational groups are classified as "low skilled". For Germany, ISCO-88 Group 1 covers senior civil servants and senior executives only and ISCO-88 Group 3 excludes teaching associate professionals which means that the number of high-skilled workers is underestimated.

2. THE INCREASE IN THE DEMAND FOR SKILLS : SOME DETERMINING FACTORS

2.1 Skill-Biased Technical Change

The first factor usually put forward to account for the increase in the demand for skills is technical change. In this respect, the main characteristic of the ongoing evolution has been the rapid and widespread development of information and communication technologies (ICTs). These new techniques generate new products and processes and, therefore, tend to modify the very nature of work itself. Is this evolution connected to the upward shift in the employment structure? And if so, in what way? These are the first questions to be examined when dealing with changing skill requirements.

On this point, the first type of evidence displayed by researchers has involved the evolution of wages. Skilled workers' wages have kept increasing despite the rise in the number of skilled people (Mincer 1993, Abramovitz/David 1994). This has been interpreted, in a very classical way, as signalling an increase in the demand for skilled labour due to the spreading of new technologies. Indeed, if the price of skills keeps increasing while its supply rises as well, this must be due to an increase in demand, itself the consequence of skill-biased technical change.

This is confirmed by the fact that wages have increased more slowly in low skilled jobs than in high skilled ones. This has been the case in quite a large number of OECD countries, leading to an important jump in wage inequality (*see Figure 2*).

Figure 2: **International 90-10 Wage Ratios between 1980 and 1990 (Men)**
Ratio of the 90th to 10th percentile of the wage distribution

Country	1980	1990
Australia	2.01	2.23 ↗
Austria	2.61	2.75 ↗
Belgium	1.90	1.92 ↗
Canada	3.48	3.98 ↗
France	3.25	3.21 ↘
Germany	2.45	2.32 ↘
Italy	2.12	2.08 ↘
Japan	2.59	2.84 ↗
Sweden	2.15	2.15 →
UK	2.53	3.21 ↗
US	4.76	5.63 ↗

Source: Machin 1994

This has been the case in Australia, Canada, Japan, the UK, the USA, Austria and Belgium, thus providing indications of upskill-biased technical change.

However, this interpretation based on the nature of technical change has been challenged. First, advocates of the Screening Theory (Spence, 1973) deny any link between wages and the evolution in the supply of skills on the one hand, and skill requirements of new technologies on the other. According to them, firms do hire people with high educational levels and pay them more, but this is not due to any positive influence of skills on workers' productive performances. What happens is that firms do not know workers' productivity when they hire them. So, they use their educational level or training achievement as a signal (an indication) of their potential efficiency. The underlying assumption is that people are naturally «gifted» and that this gift is not modified by education. Of course, one additional assumption is that those workers who are «gifted» are so, both for studies and for production, which makes it rational for firms to try and infer their potential productivity from their educational achievement. According to screening theorists, education is thus used as a screening device, a filter, whereas its impact on productivity is most uncertain. This leads to the observed upskilling of the labour force. However this signals nothing but *overeducation* and therefore cannot be interpreted as reflecting the need for more skills due to the development of ICTs.

A second line of criticism stresses that quite a few explanations can be put forward in order to account for wage inequalities and that the evolving nature of technical change is only one of them. In particular, some experts underline that most developed countries have been facing sweeping institutional changes over the past 20 years and that these would have contributed to the widening of the skilled/unskilled wage gap (Howell 1996). According to these authors (see Capelli 1995), there is evidence that many employers were adopting low-wage human resource strategies by the late 1970s, including the relocation of activities to low wage sites, the hiring of part-time, low-paid, temporary workers. This has contributed to undermining the traditional wage-setting institutions that had been protecting low skilled workers, thus paving the way for a decrease in their relative remuneration.

These criticisms have created a strong incentive to investigate more direct relationships between the nature of technical change and the upskilling of the labour force. Important empirical literature has been developed on this issue which displays a fairly strong link between the development and use of new technologies on the one hand, and the rising skill level of the labour force on the other. Basically, these studies use two types of data: firm and industry level data.

- Using firm-level data, Siegel (1995) displays a positive correlation between labour quality indices and computer expenditure. Nyholm (1995) as well as Doms et al. (1995) show that the more technologically sophisticated establishments employ more highly educated people.
- At the industry level, Wolff (1996) shows that computerisation has a positive impact on the share of highly educated information workers in the US. Bernt et al. (1992) and Berman et al. (1994) also display a positive correlation between high-technology capital intensity and the share of high skilled white collar workers in employment. Similar results are also obtained by Colecchia/Papaconstantinou (1996) for a large set of developed OECD countries.

On the whole, recent empirical work, carried out both at the firm and industry levels, displays a strong complementarity between the use of new ICTs and the skill level in the labour force.

However, the very nature of this complementarity proves difficult to assess. Do new ICTs require higher skills? Or, on the contrary, do highly skilled workers allow for the use and/or the development of new technologies? In other words, what is the direction of the causality? This question has not yet been thoroughly answered by econometricians. They are able to display a strong correlation between both variables but the causality issue remains unsettled.

One strong argument in favour of the idea that ICTs tend to increase the demand for skills is that new technologies have allowed for the development of a which calls for a highly educated labour force. According to Foray/Lundvall (1996), the enhancement and diffusion of human capital is now at the core of economic development in any society. Correspondingly, economies are more strongly rooted in the production, diffusion and use of knowledge. Foray/Lundvall (1996) argue that this advent of a knowledge-based economy is very much connected to the ICTs revolution. According to them, in the long-run, new technologies increase the potential productivity gains in both knowledge production and knowledge use. They do so by increasing the speed and decreasing the cost of developing tools for R&D, increasing the ability to generate technological options and extending the power of electronic networks. The emergence of such an «information society» calls in turn for an improvement in the quality of the labour force. Workers need to be able to handle and manage a growing amount of knowledge, which requires on their part a higher skill level than was necessary in a less information-intensive society.

This indicates that, even though the relation may not be unilateral, technical change has played a crucial role in the increase in the demand for skills. A second factor, less often mentioned, has also been of great influence. Indeed, changes in the organisation of work seem to have largely contributed to raising skill requirements.

2.2 Skill-Biased Organisational Change

Over the past decades, the organisation of work inside firms has undergone dramatic changes. The labels given to this restructuring are diverse (reengineering, delayering, flexibility, multi-skilling, empowerment, etc.) but beyond the variety of ways taken by firms, they generally signal a common trend towards placing more responsibility on workers. As the number of hierarchical layers in organisations tends to decrease, workers get more autonomy and perform a wider range of tasks. The organisation of work is becoming more decentralised as has been documented in many empirical studies: Osterman (1994) for US manufacturing, NUTEK (1996) for the Swedish economy, Greenan/ Guellec (1997) for French manufacturing. This is to be contrasted with the previously dominant scheme, based on Taylorist principles, which emphasised the advantage of setting precise norms and closely monitoring workers - Lindbeck/Snower, 1996 -.

This organisational change is closely connected to the introduction of new technologies - Ryan, 1987. These allow for more flexibility in the management of information and communication, making it possible in turn to substitute, at least partly, team work for the former centralised mode of organisation. However, in order for new technologies to generate such a change, workers need to be properly skilled - OECD, 1996. The relations between skills and organisational change are actually quite intricate - Beggs, 1996. Since decentralisation leads to the delegation of more responsibility to the lower layers of the hierarchy, it requires a high level of skills on the part of ordinary workers. The supply of skills in an economy then appears to be a crucial determinant of the prevailing mode of work organisation. This influences, in turn, the demand for skills and hence their remuneration which may, at last, influence the incentive for individuals to undertake education and training.

Caroli et al. (1997) provide a simple model of this mechanism and show that, in developed economies, as the proportion of educated workers increases the organisation of work tends to become more decentralised. When skilled labour is quite scarce, skilled wages are high and educated workers are allocated to conceptual activities. Indeed, this is where the gain in terms of productivity they bring about are higher. Correspondingly, unskilled workers are specialised in execution tasks. This gives rise to a strong division of labour characteristic of a centralised organisation of work. As skilled labour becomes more abundant, its price decreases and firms start moving towards a more skill-intensive work organisation. Workers get more autonomy and perform a wider range of task. The division of labour tends to disappear. The organisation of work is becoming more decentralised. In turn, this evolution leads to an increase in the relative demand for educated workers and the ratio of unskilled to skilled workers decreases sharply inside firms.

The empirical work carried out by Caroli/Van Reenen (1997) shows that such a mechanism is at work in UK firms. The more educated workers available in an industry and a region, the higher the probability that firms undergo organisational change. In turn, the employment structure proves more upskill-biased in those firms that have modified the way they organise work.

As for technical change, the relationship between skills and organisational change appears to be complex and, quite likely, bilateral. However, here again, there is no doubt that organisational change has played a crucial role in raising skill requirements. Given the major influence of both technical and organisational change, we can go one step further and assess the nature of the skills required to cope with these changes. This will ultimately allow us to draw a few implications for education and training policies in our knowledge-based economies.

3. SKILL REQUIREMENTS AND SKILL PRODUCTION

3.1 Skill Requirements

What kind of skills are required in order to cope with the spreading of ICTs and the increasing decentralisation in work organisation? Are these requirements compatible? These questions, though not very often tackled in the theoretical literature, are of great practical importance since they condition the type of education and training policies that should be implemented in the present transition towards an information society.

Concerning technology, researchers have shown that the new ICTs require higher skills for two main reasons. First, the improvements in the means of communication made possible by the development of ICTs tend to ease the internationalisation of production. So, a large part of the activities requiring unskilled labour can be relocated from industrialised to developing countries. As a consequence, firms' requirements in terms of skills tend to rise in the latter. Against this backdrop, the emergence of a global information society - due to the development of ICTs - first increases the need for skills in OECD countries through its stimulative impact on international competition. A second reason for the positive complementarity between skills and ICTs is that the role of information processing is becoming crucial in the production process. This feature of new technologies was pointed to by P. Ryan as early as 1987 in his far-sighted OECD monograph. Since then a lot of studies have been carried out which confirm this trend. Capital equipment tends to become more fragile so that workers must be able to cope rapidly with a large span of unforeseen difficulties arising in the production process. In this context, an efficient reaction requires a good capacity of synthesis as well as the ability to communicate with peers in order to assess the origin of the breakdown. Moreover, workers must be able to handle the increasing amount of information processed in the production activity as well as to take initiatives in order to adapt the production process to an increasingly unstable demand. This requires a high degree of multi-skilling in workers.

Decentralisation of work organisation also requires workers to have a large span of competencies. One consequence is that workers perform a wider range of tasks. They are also more autonomous since the role of the hierarchy is noticeably reduced. These changes mean that workers have to be able to face more responsibilities and switch to new activities both in the course of their careers but also at a given workplace. The counterpart of a less hierarchical organisation of production is thus, here again, the need for more multi-skilled workers.

So, the direct consequences of both technical and organisational change are very similar. Workers - either white or blue collar - need to be endowed with highly *transferable* skills and a good level of *general education*. Of course, in the short run, very specific skills may be efficient for one given task. But in the medium and long run, the tasks performed by each worker are bound to evolve. New products and, more importantly, new processes will appear which will require new skills from workers. So, in a dynamic perspective, transferable skills are very necessary. A good level of general education is also required in order for workers to cope with a higher degree of autonomy and responsibility. They need to be able to analyse situations and take appropriate action without waiting for the hierarchy to provide them with instructions or orders. Similarly, they have to be endowed with general knowledge in order to be able to perform various tasks which may be quite different from each other.

Starting from the fact that a high level of transferable skills and a good general educational background are required from workers in the transition towards an information society, the last question we need to address is, How can these skills be provided? What can be done in order to improve the education and training level of the workforce? This question is particularly crucial for those workers with «lower intermediate skills» According to the definition proposed by the British National Institute for Economic and Social Research, lower intermediate skills are acquired at work, as well as in secondary level VET, that is in the Dual System or in full-time technical high-schools in Germany, in the apprenticeship system or in the various Youth Training Schemes in Great Britain and in CAP and BEP curricula in France. They usually amount to quite narrow competencies: workers with lower intermediate skills have typically learnt how to perform a defined series of tasks, but are not really prepared to take responsibilities or to adapt to different activities. As we have already seen, these turn out to be decisive abilities in order to cope with the requirements of spreading ICTs and decentralisation in work organisation. Therefore, the average level of intermediate skills definitely needs to be raised so that most, if not all, workers are endowed both with broadly transferable skills and with a good capacity to adapt and to learn. How is this objective to be achieved?

3.2 Skill Production and the Wage-Labour Nexus

The nature and potential efficiency of the measures that can be suggested in order to enhance intermediate skills strongly depend on the analysis of the determinants of the skill level. In this respect, the institutional approach provides interesting results which fruitfully complement those displayed by a more traditional approach.

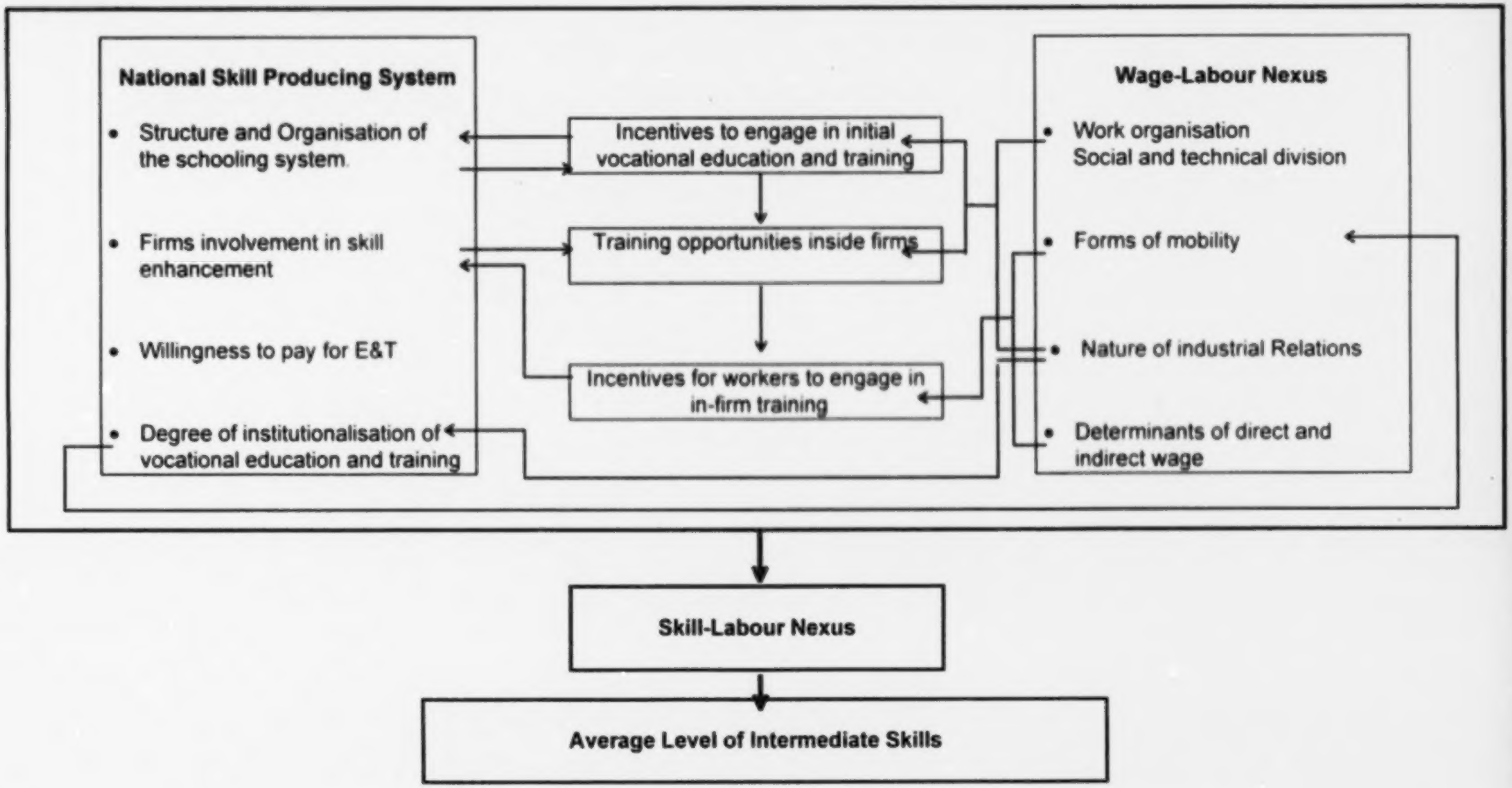
The traditional approach to the determinants of the skill/educational level was developed in the 1960s and 1970s. It is very «school oriented» and mainly involves estimating educational production functions: experts try to determine which are the main factors influencing pupils' scores in various school tests. The first results - Coleman 1966, see Hanushek 1986 for an exhaustive survey - show that there is no systematic relationship between school expenditure and pupils' performances. The main determinant of students' scores is definitely the family or social background. So, the first policy implication that can be drawn from these results is that educational policies should not be restricted to the allocation of funds to the school system. They have to encompass an important social dimension.

However, more recent studies display the need for minimum funding of the school system. Card/Krueger (1992) show that the quality of schools as well as of teaching conditions positively influences future earnings of students. Since these at least partly reflect the productivity of workers, school expenditure appears to enhance pupils' general capabilities.

So, the traditional analysis in terms of educational production functions suggests two types of measures which are likely to enhance the average level of intermediate skills, since these are partly acquired at school. The first ones should focus on the social environment of pupils - social policies - and the second ones should ensure a minimum standard in the school system. Even though they are fairly different in their precise content, these two policies share an important feature: they are both school as well as supply-side oriented. But this is only part of the answer since intermediate skills are also acquired at work.

This feature is explicitly taken into account by the institutional approach. This suggests that production and valorisation of human resources are closely interconnected. In fact, they articulate to each other to determine the *national level of intermediate skills*. Based on a fairly detailed study of education and training systems in five OECD countries, we have shown - Caroli (1996) - that the level of intermediate skills in the workforce depends both on the characteristics of the *National Skill Producing System* and on the *Wage-Labour Nexus* (*see Figure 3*).

SKILL-LABOUR NEXUS AND THE AVERAGE LEVEL OF INTERMEDIATE SKILLS



National Skill Producing System

- Structure and Organisation of the schooling system.
- Firms involvement in skill enhancement
- Willingness to pay for E&T
- Degree of institutionalisation of vocational education and training

Incentives to engage in initial vocational education and training

Training opportunities inside firms

Incentives for workers to engage in in-firm training

Wage-Labour Nexus

- Work organisation
  Social and technical division
- Forms of mobility
- Nature of industrial Relations
- Determinants of direct and indirect wage

Skill-Labour Nexus

Average Level of Intermediate Skills

Source : Caroli (1996)

3.2.1 The National Skill Producing System

We define the National Skill Producing System as a combination of four elements:

- the structure and organisation of the school system,
- firms involvement in skill enhancement,
- the willingness to pay for education and training,
- the degree of institutionalisation and codification of education and training.

Each of the four components may undertake various forms which eventually determine the performance of the system. The organisation of schools varies a great deal across countries. This leads to a variety of performances of technical and general educational systems. These do not endow pupils with the same level of basic knowledge - for general education - nor with the same vocational competencies - for VET. Firms' involvement in skill enhancement differs even more widely across countries. Initial training may consist of full-time apprenticeship or be part of a dual system, or may even be provided via rotation among posts. Similarly, continuous training is more or less structured and may or may not be focused on those workers whose educational level is already the highest. The willingness to pay for education and training is also very different from one country to the other. Finally, the degree of institutionalisation of education and training may also vary a great deal. Codification plays an important role by facilitating the identification and recognition of diplomas and qualifications by firms. Whereas it is extremely widespread in Germany or France, it is on the contrary quite scarce in the UK or the US.

On the whole, the National Skill Producing System is more or less efficient as an intermediate skill producer according to the forms taken by each of the four elements. This is quite intuitive since it is the very locus of skill production. Therefore it comes as no surprise that its characteristics considerably influence the quality of its «output», namely the average level of intermediate skills.

3.2.2 The Wage-Labour Nexus

The Wage-Labour Nexus is also defined with reference to four elements:

- the organisation of work inside firms
- the forms of mobility
- the nature of industrial relations
- the determinants of direct and indirect wages.

As for the National Skill Producing System, each of these components may undertake different forms which determine the more or less co-operative nature of the Wage-Labour Nexus. The organisation of work may be more or less hierarchical and may give more or less responsibility to blue-collar workers. The forms of mobility may also be very different. Firms may rely either on external or internal labour markets and if they rely on internal promotion, the criteria may be seniority or, on the contrary, individual abilities and performances. Accordingly, industrial relations may be highly adverse or favourable. And finally, wages may depend more or less on initial education and training as opposed to continuous training, age, seniority... According to the form taken by each component, the Wage-Labour Nexus ends up being more or less *co-operative*. By co-operative, we refer to a Wage-Labour Nexus characterised by a non-hierarchical work organisation, smooth industrial relations and forms of mobility as well as of wage determination which value the skills acquired by workers through initial and continuous education and training.

The four components of the Wage-Labour Nexus influence the level of intermediate skills produced in an economy via three main channels:

a) A co-operative Wage-Labour Nexus creates informal training opportunities inside firms. First, the organisation of work being more decentralised, workers perform a wider range of tasks and, therefore, benefit from opportunities to increase the span of competencies they master. Similarly, rotation among posts is more frequent and allows workers to widen the range of activities they can perform. A second element is that firms are more prone to invest in continuous training when industrial relations are peaceful than when they are highly adverse.

b) When mobility and wage-setting rules do value the acquisition of new skills, workers themselves have more incentive to invest in initial as well as continuous education and training.

c) Finally, the image of vocational education and training - one of the main providers of intermediate skills - strongly depends on the recognition of the corresponding diplomas by firms, both in terms of remuneration and carrier. In turn, this recognition improves the quality of the pupils who engage in VET and therefore, the corresponding intermediate skills.

3.2.3 The Skill-Labour Nexus

On the whole, the National Skill Producing System and the Wage-Labour Nexus articulate into a Skill-Labour Nexus which stands as a crucial - unique? - determinant of the average level of intermediate skills. Our institutional analysis thus yields an important result, namely the fact that intermediate skills depend both on supply-side factors - as already underlined by the classical approach - but also on demand-side ones and, more specifically, on the way education and training and the resulting skills are valued inside firms. This bears of course some consequences for education and training policies. We will outline them as a conclusion.

4. CONCLUSION: IMPLICATIONS OF EDUCATION AND TRAINING POLICIES

Given the very close articulation of production and valorisation factors in determining the level of intermediate skills, policies should not be restricted to supply-side measures. Of course, supply-side measures are crucial. When a country wants to raise its level of intermediate skills, it must definitely try to improve teaching and training conditions. But, it must also try to enhance a more co-operative Wage-Labour Nexus.

Indeed, one of the main results put forward by the institutional approach is that the efficiency of any skill policy is heavily dependent on its consistency, that is, on its ability to articulate measures focusing both on the National Skill Producing System, that is the supply side and on the Wage-Labour Nexus, that is the demand side. As a consequence, European and OECD countries are currently facing a major challenge. If they want to cope with the requirements of spreading ICTs and increasing decentralisation, that is, if they want to be able to produce the fairly general and highly transferable skills that are needed, they must engage in a profound *political* revolution.

What we mean here is that they must articulate, and probably integrate, two types of policies which are usually implemented by different institutions. Namely, they must integrate school and training policies on the one hand with labour market and work policies on the other hand. This is not a minor challenge.

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NEW TECHNOLOGIES AND WORK ORGANIZATION - IMPACT ON VOCATIONAL EDUCATION AND TRAINING

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1. INTRODUCTION

Since the beginning of the 1990s companies in many industrial nations - not only in Western Europe but also in the USA and Eastern Asia - have been introducing wide-ranging reorganization processes to secure their competitiveness in times of turbulent market developments through cost reduction, quality enhancement and shorter innovation cycles. In contrast to earlier rationalization measures, the efforts here are not primarily directed to technology-assisted modernization strategies, but to systemic changes in which company business and value-added processes are being newly restructured and different forms of work and use of human resources are being introduced through new organizational and control principles (based on networked information and communication technology).

"Lean production" became the ideal for a production and work model which presented the prospect of a comprehensive concept to meet new challenges for which the companies had, up to now, tried to find responses in a cumbersome "trial and error" process. In the meanwhile, however, this ideal of a uniform modernization path - mainly oriented to US American and Japanese concepts - has lost some of its fascination because it is becoming apparent that this path tends to ignore the divergent social and cultural frame conditions in Europe which determine not only the design of production and work organization but also initial and continuing training routes.

Recent surveys (cf. inter alia Hoss/Wirth 1996) confirm today with some plausibility that European companies are trying to find their own paths to re-shape their production and organizational structures. Supported by a series of empirical studies, it is pointed that there is a "European model" of new production management which clearly differs from the Asian and US American approaches through more individual responsibility, greater autonomy of groups, less hierarchy and broader forms of participation.

Even though these general work policy characteristics have their specific country, regional, branch and company features, and the resulting requirements for qualification and training of workers are often deflected by traditional national principles governing the organization of vocational initial and continuing training, this development compels convergences in qualification and performance standards which throw a new light on the interrelations between "technology, organization and qualification". Economic and strategic change in companies - as is becoming clearer today - is corresponding much closer to technological, work organization and qualification change which is propelled most strongly in direct value-adding areas. Through this, human work potential acquires greater significance as a commercial and economic resource. Furthermore, through the new interchange between innovations in technology, organization and qualification, new requirements arise for the design of vocational training processes.

The following article will examine questions relating to organizational and structural developments and the contents of initial and continuing vocational training under the conditions of modern production and organization concepts in the industrial sector. The many diverse demands on initial and continuing vocational training arising from the establishment of a new services sector in Europe and envisaging a new synthesis of integrated technological, organizational and training solutions, have intentionally been excluded in this article. Because, care should be taken to see that a too-hasty thesis on the transferability of industrial modernization concepts does not prevent the necessary examination of the structures and specificities of services segments. On the contrary, a greater in-depth examination is needed which throws more light on developments in the services sector and makes more plausible statements on the necessity of shaping initial and continuing vocational training in these sectors.

2. THEORETICAL FRAMEWORK

„Business Re-engineering"(Hammer/Champy) is the generic term used frequently in literature today to denote the change in management principles and corporate concepts which moves away from Tayloristic mass manufacture and envisages structural changes in work design. What is characteristic of these changes - in some places even euphoristically termed work paradigm changes (Bullinger/Gidion 1994) - is the efforts of the companies to encounter the demands and problems arising from changing markets, fierce international competition and the need for more innovations. All relevant international studies on the subject confirm that the decisive factors affecting the competitiveness of companies are

- the capacity for rapid product and process innovation and the introduction of new products on the market (innovativity, time to market),
- swift reactions to dynamic changes in the environment and turbulent markets (transformation from a sellers' to a buyers' market; flexibility; customer orientation),
- the internationalization of corporate strategies (globalization, ability to take action on world-wide sales and procurement markets).

At the same time - against the background of more internationalized competitive relations between the industrial centres North America, East Asia and Western Europe - the necessity of permanent change and innovation to secure "European competitiveness" becomes indispensable. In contrast to conventional rationalization measures with partial change, it is not only comprehensive "systemic" rationalization which becomes a decisive challenge for corporate reorganization processes; what seems to be required is organizational structures which open up learning processes which make it possible to acquire coping skills to deal with permanent change and, as far as possible, to incorporated them in the organization as a stable competence. Staudt et al. (1994) call this challenge to company management the „management of non-routine processes" which, more than ever today, covers organizational and personnel development in addition to corporate and technological development.

This view implies a more or less general change of perspective in the assessment of factors which are economically relevant and essential for the flexible adaptation capacity of companies. The fascination of the MIT study published in 1992 on "The second revolution in the automobile industry" (Womack/Jones/Roos) and the soaring career of the catchword "lean production" sprang from the promising thesis of "one best way" for corporate modernization strategies which, in the view of its authors, could be implemented wherever technical production was planned and designed. But today, the thesis of the convergent power of a world-wide modernization of companies based on the use of new technologies, tends to be viewed critically. On the contrary, the premise - substantiated by recent national and Europe-wide studies - of the new significance of so-called "soft strategy resources" such as organization and qualification is gaining ground.

Economic and strategic changes in companies are becoming identical with changes in technology, work organization and training processes which proceed most rapidly in the areas producing direct added value. Technological innovations, in particular the new information and communication technologies, have created the pre-conditions to replace mass production based on division of labour with flexible specialization. Complex logistics systems enable not only the coordination of production planning, control and implementation in a context of general decentralization, but also facilitate the concomitant flexibilization of work processes and structures.

They create the pre-requisites for new approaches in corporate labour policy which will probably lead to far-reaching challenges on personnel development and on initial and continuing vocational training processes. In this context, two factors play a growing role in the ability of the company to cope with change: the skills of the employees and the organizational design of work. Today, the differentiation between companies is becoming less dependent on their products and services. There are also many signs that - given the generalization of knowledge and the globalization of markets - technology at a general level will not vary much. Competition is shifting more and more to the level of the employees. The progress of a company now depends on their specific skills and qualifications. But, these skills can only be developed and effectively applied - as a thesis supported by numerous studies indicates - if organizational forms in the company encourage the continuous expansion and updating of knowledge and know-how in different operational areas.

The essential barriers to learning and innovation in companies - according to the relevant literature on innovation theory - lie in the fact that hierarchical organizational structures with a strong division of labour, with sectoral, technical and departmental boundaries, with status and competence demarcations, with compartmentalization of knowledge to maintain power, and insufficient participation of the staff in corporate decision-making processes, impede a cross-sectoral flow of communication and information (Kern/Sabel 1994). In contrast to this, there is the model of the "learning organization" (cf. Stahl/Nyhan/D'Aloja 1993), the decentralized organization (flat hierarchies) based on self-regulation (partly autonomous teams), participation (participatory decision-making) and trust (tolerance vis-à-vis errors) which makes it possible to integrate know-how and experience across the boundaries between the technical groups. An essential pre-condition for this is considered to be a process-oriented organization of structures and tasks. In order to raise the willingness of employees to make their experience and their tacit knowledge explicit and to share them with others, organizational structures and principles are required which give the persons concerned the guarantee that the disclosing their knowledge will offer them better career and employment opportunities (cf. inter alia Georg 1995). Secondly, a learning-intensive work organization and an interlinkage between working and learning is required in order to generate a permanent motivation to learn and to ensure the quick application of knowledge and know-how.

The growing call for the "learning organization" which will secure innovative capacity and thus the survival of companies, has triggered an ambivalent reaction in the discussion on vocational training which ranges from the euphoristic acceptance of this new concept to a detached view of the latest "vogues" in organizational development. Many critics consider the "learning organization" to be nothing more than an imperfect metaphor because organizations cannot learn like individuals. The general scientific discussion of the "learning organization" is, however, more pluralist in nature and is influenced at the international level by the concept of organizational learning presented by Argyris/Schön (1978) and the work published by Senge (1996) "Die Fünfte Disziplin - Theorie und Kunst der lernenden Organisation (The fifth discipline - theory and art of the learning organization)". Both approaches deal with large-scale organizational development and innovation processes which, as learning processes, aim not only at changes in behaviour but also changes in structures if the latter happen to block the innovative capacity of organizations (Probst 1995). Here, individual and organizational learning are linked in a motivated complex relationship. As established by Argyris/Schön and subsequently by almost all other authors, organizational learning presupposes that the individual members of an organization learn through communication with one another: "There is no organizational learning without individual learning" (Argyris/Schön 1978).. This means that individual and organizational learning should not be viewed as "either/or" approaches but two "co-existing" approaches. Initial and continuing training activities at the personal level will continue to be an essential part of individual development measures and there is no sound reason for the assumption in some places that learning organizations can, in the short or long term, forego such qualification requirements.

However, the fact that the tasks assigned to initial and continuing vocational training in learning organizations and in innovative work and organizational structures are quite different to those arising in highly automated work processes with a strong division of labour, is substantiated by all recent national studies and comparative surveys in the industrial nations of Europe. In future, learning in innovative organizations cannot be a mere reaction to new technologies and work in changed organizational structures, but must take the form of a designing and shaping process in interrelationship with the changing environment. In the context of this new orientation the concepts described years ago under the key terms "vocational education and training and in-company organizational development" (Dybowski et al. 1993; 1995) now acquire topical interest.

The pre-conditions for this are based on an opening of vocational training at the following levels:

- *In terms of content* the aim is an opening towards the real life and work context of the learners. Weight is attached to forms of active learning which intentionally use experience as a means of supporting self-managed learning and of developing individual knowledge and know-how in teams in order to link it with the knowledge and know-how of other actors.
- *In terms of method* the aim is an opening for new forms of learning and for participation by the learner in the shaping of the learning process. Learning organizations which constantly try to expand their willingness and capacity to change by enhancing the problem-solving competence of complex social organisms, base this first and foremost on the design potential of their employees. Thus, organizational practice feeds on individuals and their individual abilities to grasp, analyse and appraise the situation in question and to communicate this to others in order to find the most appropriate solution under the given circumstances.
- *In organizational terms* this means an opening vis-à-vis changing processes and organizational forms in initial and continuing training. By perpetuating opportunities to learn in innovative structures, the conventional possibilities of learning are expanded to include new learning venues such as "on-the-job learning", "learning stations" or "learning islands", "learning in teams", etc. A differentiation is made between decentralized and central learning venues which can be combined in the company and used through rotation and staff development paths. Combinations of non-company learning venues increase and can be used as a means of integrating training activities in the company and in public educational establishments (schools, universities).
- *In strategic terms*, initial and continuing vocational training acquires new significance as a means of safeguarding the competitiveness of companies. The willingness and capacity to learn of staff members, teams of workers and organizational units becomes indispensable in order to achieve constant improvements, to ensure quality, to function in a customer-oriented manner on the market and to produce intelligent products and services. In addition to this, it is the basis to cope with increasingly faster change in the corporate environment and to be successful on the market. This means that - from the angle of business management and recent organizational theories - the learning capacity of organizations and the learning potential of the employees turn into a central survival factor, and the speed of learning becomes a new differentiation criterion in competition (Wildemann 1994).

The above-mentioned necessary opening of initial and continuing vocational training to a new interrelationship between individual, organizational and inter-organizational learning implies new training requirements which seem to acquire universal significance above and beyond the national specificities of vocational training systems in Europe. This supports the assumption that the globalization of markets necessarily compels an internationalization of company and organizational structures and related qualification and performance standards. Qualification and training measures will now be measured by an international comparison of quality, efficiency and cost aspects. This occurs not only indirectly through product competition but, to a growing extent, through direct comparisons which become imperative through the re-location of production areas to other countries or the creation of world-wide manufacturer-supplier networks. In this process, diverging national education and vocational training systems confront one another and have to stand the test of comparative profitability and market criteria. "The importance of the national features and traditions of work culture and corporate culture declines" (Dehnbostel 1997). Examples from the automotive industry and the case studies from the motor vehicle repair sector and chemical industry selected for this article show that cost calculations and work organizational efficiency criteria lead to extensive internationalization and approximation of qualification levels and thus - especially in continuing training - to a strong approximation of forms of training. Thus, in all European countries in the last few years - as numerous research projects and comparative studies backed by the support programmes of the EU show (cf. inter alia Brandsma/Kessler/Münch 1995; Rauner/Spöttl/Olesen/Clematide 1994) - a new "type of continuing training" has developed at company level which "is connected to the far-reaching change processes in the companies (new forms of work organization, quality assurance, continuous improvement processes, participation and corporate culture). This type of continuing training is linked to the workplace and related to the tasks, it is short but continuous training" (Heidemann 1997). In the field of initial vocational training too, the company has become more important as a learning venue in almost all countries in Europe. The trend towards "alternating" systems of training has gained ground in the last few years. However, no answer can be given here to the question whether these development trends will necessarily lead to closer coordination of national vocational training policies and/or to more mutual adjustment of national vocational training systems.

3. COMPANY CASE STUDIES

The aim of this chapter is to analyze and discuss technical, organizational and policy changes from the outside perspective of hypothesis-based research. But at the same time the reader will be offered theories - through the documentation of appropriate "scenarios" in their complexity - of getting acquainted with the paths of change in the companies and their repercussions on vocational training. This will be done by presenting the following four case studies which attempt to trace practical restructuring processes in a renowned German machinery manufacturing company (3.1), a factory of a well-known German car manufacturer (3.2), in motor vehicle repair shops in Europe (3.3) and in two Dutch firms from the chemical sector.

All four case studies present restructuring processes which - irrespective of whether they concern an individual firm (case studies 3.1 and 3.2) or several firms in a sector (case studies 3.3 and 3.4) - have an important illustrative significance for the definition of future requirements in vocational education and vocational training research. The common point of departure for these changes was a new orientation to the market and to the customer. In some cases an attempt was made to meet the challenge of global competition through more flexible technology and work organization, in others existing products and processes were subjected to stricter quality standards. But in every case the goal was to defend existing market shares, satisfy the higher expectations of customers and adapt quality and organization of production as flexibly as possible to changing market and customer requirements.

The path pursued in the following case studies of taking the company as the frame of reference for a research-guided but mainly practice-oriented definition of future demands on vocational education and training, is intentionally linked to the methods of the relevant FORCE surveys. This approach makes it possible to examine vocational training and its further development in the context of the changes occurring in technology, work organization and qualification requirements in the company. Furthermore, if the company is the frame of reference, it is possible to derive corporate tasks and the changes in tasks arising from technical and organizational innovations and their interrelationship with vocational training, and thus counteract the short-sighted assumption widely prevalent in vocational training research and practice that future training contents can be derived from the "new technologies". "The technology-influenced understanding of the links between technology and training was often rejected as unfounded and unsuitable, but up to the present it has not lost its attraction for European cooperation in the field of joint vocational training programmes. As these technologies appear to have generally valid contents, especially if their concrete application-specific features are abstracted, they present no problems in being taken as the common point of departure for transnational vocational training initiatives. EUROTECNET and COMETT are vocational training programmes which follow this logic." (Rauner/Spöttl 1995). But the central challenge for the further development of European vocational education and research in this field is to make its own contribution to company innovations and, above and beyond this, to improve the innovative environment of the different European regions and firms. The methods used to examine and describe the dynamics of the interrelationships between technology, work organisation and vocational training constitute the first step.

3.1 Shopfloor learning and working islands in the Carl Schenk AG, Darmstadt[1]

Carl Schenk AG is considered to be one of the leading international machinery and industrial plant manufacturing companies in the field of measuring, conveying, testing and balancing technology and customized software. With a turnover of DM 1 billion the company employs approximately 7,000 persons all over the world. In Darmstadt, the headquarter of the company, it has about 3,500 workers. The diversity of components required for customized solutions is reflected in the large number of design drawings which have to be produced afresh every year; at the same time, batch orders are small with a low level of recurrence. In order to meet customer demands for short lead times and delivery periods, this volume of work can only be completed with the integrated use of software aids together with the innovation and creativity of the staff.

In view of the growing severity and globalization of competition, the company management was compelled at the end of the 1980s to establish internal information networks and to make better use of available human resources for corporate processes. This was virtually impossible in the existing organizational structure with its high inputs for planning, control and quality assurance. Furthermore, the bonus system of remuneration practised for many years where salary depended on volume of output, led to individual patterns of behaviour which were contra-productive to the corporate process.

In 1988, with the collaboration of the Works Council, a new personnel management concept aiming at "New forms of Cooperation (NFC)" was developed in the company and tested in 1991 for the first time on the shopfloor with a pilot group of CNC operators. Today the "New forms of Cooperation" have been introduced in all production areas in the company. The focal point of this concept is "Management by Objectives (MbO)" which was already developed and introduced with success in the USA in the 1980s (cf. Pfeiffer 1993). This management concept has the aim of greater performance through participation and entails flatter hierarchies.

The central working principle in this concept is team work in a process of mechanical production with individual workplaces which, because of small batch sizes and many new workpieces, is based on classical workshop production. The technological requirements for the manufacture of these workpieces are influenced by the lack of similarity in the shape of the parts to be made, the complexity of the operations, the diversity of the raw materials and the demands of the materials on machines and operators. The operations in the individual workplace did not consist of work on the same workpiece. In the meanwhile, the demands on the team members have changed considerably through the extension, variation and rotation of tasks, e.g. through additional tasks for quality assurance, tool preparation and workholding. The linkage with pre-production and post- production sectors has become closer and this means more coordination. The degree of self-responsible and self-guided design of the process essentially depends on the "social maturity" of the team members and has developed considerably. Decisions have to be taken on scheduling, production and capacity planning, the results have to be ensured and costs kept in mind. The changes are reflected in the demands on the skilled workers, as the results of an in-company survey covering the categories "Technical/Operational", "Planning/ Scheduling" and "Personal/Social" showed (see Fig. 1).

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[1] The following sections are extracts from reports written by Derriks (1995), pp. 43 - 53 and Derriks/Schlottau (1995), pp. 185-206.

Figure 1:

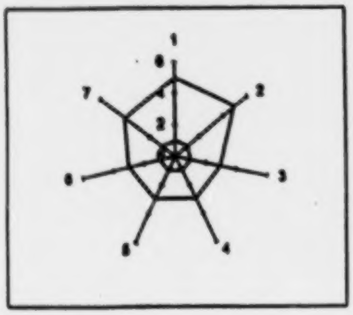
Potential changes in requirements arising from introduction of team work in production

Qualification requirements in production

Assessment criteria	Degree				
	low		medium		high
TECHNICAL / OPERATIONAL					
Requirements for job content…					
Preparation of tools	O			G	
Machine setting					X
Machine operation					X
Programme optimization				X	
Workshop programming	O				G
Working on workpieces					X
Qualitiy inspection				O	G
Variation of workpieces					X
Logistics/Transport	O		G		
Removal of disturbances	O		G		
Maintenance	O		G		
PLANNING / SCHEDULING					
Requirements for planting and control …					
Production control	O				G
Scheduling	O				G
Capacity utilization	O		G		
Machine allocation / Job order allocation	O			Gk	Gnc
Costs	O			Gk	Gnc
Liaising with pre-/post-productive areas	O		G		
Preparing documentation	O		G		
Coordination with team members	O				G
PERSONAL / SOCIAL					
Requirements for…					
Working together/cooperation	O				G
Communication	O				G
Conflict-solving	O		G		
Stamina	O		G		
Ability to make decisions	O		G		
Willingness to bear responsibility	O		G		
Knowledge transfer to colleagues	O			G	

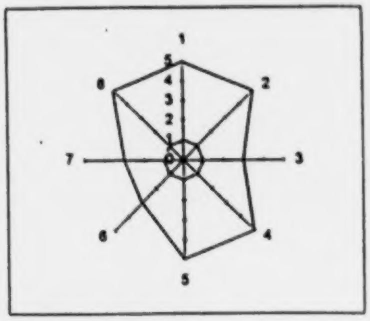
Legend
X - general characteristic
O - before introduction of team work
G - after introduction of team work
k - convential technology
nc - NC technology

Qualification requirements
Personal / Social



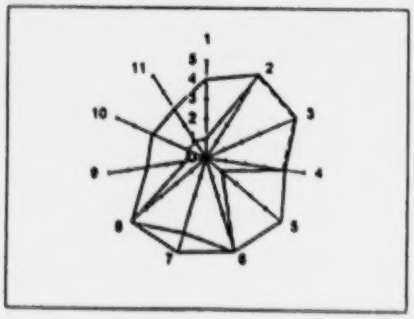
1 Working together/cooperation
2 Communication
3 Conflict-solving
4 Stamina
5 Ability to make decisions
6 Willingness to bear responsibility
7 Knowledge transfer to colleagues

Qualification requirements
Planning / Scheduling



1 Production control
2 Scheduling
3 Capacity utilization
4 Machine allocation / Job order allocation
5 Costs
6 Liaising with pre-/post-productive areas
7 Preparing documentation
8 Coordination with team members

Qualification requirements
Technical / Operational



1 Preparation of tools
2 Machine setting
3 Machine operation
4 Programme optimization
5 Workshop programming
6 Working on workpieces
7 Qualitiy inspection
8 Variation of workpieces
9 Logistics/Transport
10 Removal of disturbances
11 Maintenance

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The objectives set out in the team work concept were increasingly oriented to the following work areas:

- assumption of quality control;
- introduction of new resources;
- planning for processing from beginning to end;
- extension of self-control;
- reduction of toolsetting times;
- raising the effective use of resources;
- raising the number of productive hours;
- throughput optimization of processing programmes;
- producing suggestions for improvement;
- integration of cleaning operations.

As a reaction to market changes and severe competition through the recession, a fitness programme which focuses all activities on the customer was introduced in the company in September 1993. This new value system called "Schenk customer orientation" with the abbreviation "Kick" has the aim of enabling a more efficient and faster response to customer expectations. The areas of activity covered by this programme are staff development, procurement, project management, quality and time management, customer management. Within these areas of activity for which change teams have been created - analogous to the change agents in organizational development - the New forms of Cooperation will be integrated in quality and time management and then extended to the fabrication areas.

The radically changed work organization in production and the resultant considerably enhanced demands on the skilled workers at their place of work brought about by the introduction of qualified team work, compelled the central training department of the company to undertake a complete review of its training concepts. The broad spectrum of technical, cross-sectoral, social and creative skills the skilled workers will require in future could no longer be adequately taught in the traditional training venues alone (e.g. class-rooms, training workshop of the central training department, individual workplaces on the shopfloor). The question requiring an urgent answer was whether it was not possible to learn and work in groups already in initial vocational training in order to thus train the specific skills required later in team work. The core of the innovative solution for modern training with a high standard of qualification lay in the establishment and development (at first) of a "learning and working island" in the area of mechanical fabrication. In the course of time, further learning and working islands were established in other areas of production and operation. From the conceptual angle, they are based on a combination of different technical and pedagogically coordinated learning venues where the training is given in alternating time sequences.

The essential feature of these "learning and working islands" to which the trainees are transferred after a two-year training in a training centre, is that they are integrated as a group in the production process. This learning venue which is closely linked to the fabrication process is intended to impart the broader qualifications required for team work. To achieve this end, the machines in mechanical fabrication, i.e. the conventional turning and milling machines and the NC machines which up to now were available as individual workplaces for trainees, were put in the same area and equipped with all aids required for work planning and control, workshop programming, machine tool organization and quality assurance.

The production section is responsible for the costs of the learning and working island. Thus the island is directly integrated in the production process. It receives its orders directly from the computer-controlled order and planning system and also gets orders from the foreman, from work planning or other departments. As it is responsible for the costs of the learning and working island, the production section has an interest in optimizing the integration of the island in the production process. But this integration also means hard production objectives in connection with production targets and quality assurance.

The trainees and the trainer have a high degree of responsibility for the quality assurance of the manufactured parts, because there is no subsequent quality control. Quality assurance is an integral part of the job order in all production teams and thus also in the learning and working island. Central quality control in production today concentrates mainly on special measuring techniques for highly precise measurements. The trainer of the learning group has the freedom to select the methods to be applied for quality assurance. He bears the responsibility, supervises the process and carries out selected controls in those cases where the trainees are not yet able to ensure full quality control.

As awareness of product quality is becoming a vital feature of training, a 14-day training phase is organized in the quality control department in addition to work in the learning islands. Here, not only high quality requirements and different measuring techniques are taught, but the ability to assess what quality requirements are really required for individual parts is enhanced. This aspect is particularly important to make workers aware of costs. For instance, for understandable safety reasons, the design departments sometimes prescribe excessive tolerances which can only be achieved with considerable inputs in production. Often, somewhat larger tolerances would have no influence on the efficient functioning of a part but would lead to a considerable reduction of production costs. In such cases, the skilled workers have to contact the design departments in order to get these prescribed figures changed. The ability to make the right assessments here and to take the initiative if necessary, are important learning objectives for the trainees in this phase of training. At the same time they are progressively introduced to operational problem identification and solving processes.

In the learning and working islands the trainees learn how to process job orders. Processing not only includes autonomous planning, execution and monitoring of the work segments. This work has to be done in a team and also has to be systematized. That is why the trainees have to coordinate their tasks themselves, they have to learn how to conduct consultations and write protocols and have to learn presentation and visualization techniques. The trainer has to design the necessary methods for this purpose, a new task for training staff for which they also have to be trained.

Ability to take complex and qualified action which includes the necessary technical, methodological and social skills and also autonomous process and method design, does not originate by itself but has to be acquired step by step starting in the training phase. This can only be done successfully if appropriate frame conditions which stimulate learning are created. Training methods which foster autonomous action have to be systematically applied. Furthermore, an open climate has to be created for social learning. It is the responsibility of the training staff to see that these conditions are ensured. This first of all means that the training staff have to possess the necessary technical, pedagogical, learning-organizational and methodological skills or acquire them.

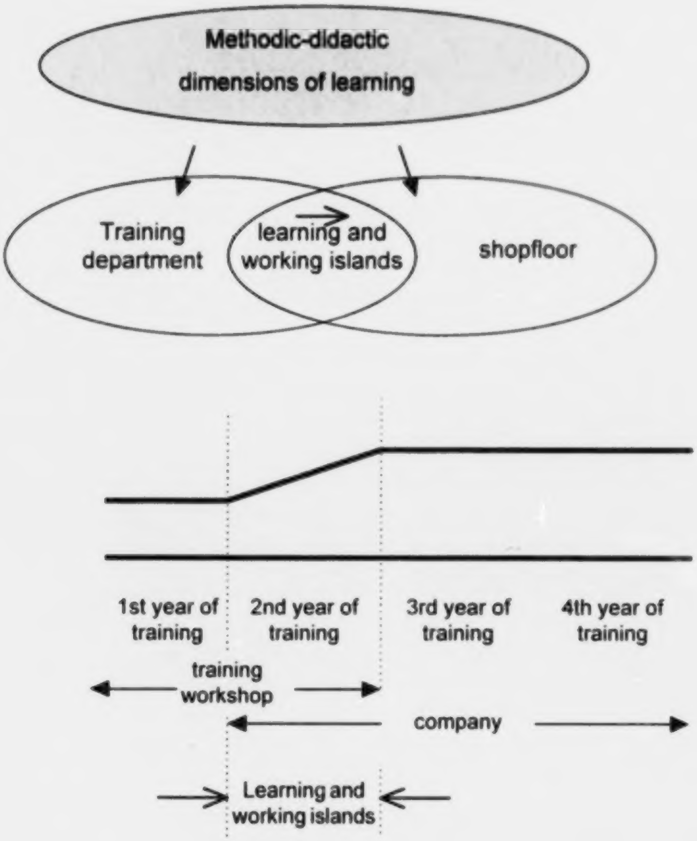
Autonomous learning as an organizational principle of training calls for changes in mentality and patterns of behaviour both in the trainees and, in particular, in the trainers. The pedagogical activities of the training staff will not lose importance or become superfluous. Consultations between the trainers and the trainees will continue to be important elements of training. But the structure and the objectives of these consultations will acquire a different function in many parts of training. They will not take the form of instructions to the group but individual advice in problem situations and guidance of the learning processes of the trainees. Even if the trainees are given a more active role and much more individual responsibility, this does not liberate the trainer from his overall responsibility for the success of the training. This also means that the trainer does not leave the trainees completely to themselves, but sets the framework in which the trainees acquire the desired skills through self-managed learning and working steps. Furthermore, with regard to their technical qualifications, the trainers will have to master several technical areas in line with the complex work processes in production where new technologies are permanently required, and they will have to rotate between the training workshop and the learning islands on the shopfloor. Only then can it be ensured that the training staff will have updated knowledge of the technology and work organization applied in production and thus provide training geared to the modern requirements of industrial work.

On the whole, the five years of experience with the modernization of training and the creation of learning and working islands as an interface between training and production, have shown that contacts with actual work situations have become more intense. Furthermore, by introducing the in-company training phase at an earlier stage, the trainee could acquire real work experience much earlier and start sooner with the gradual socialization process in the corporate world.

Formerly, the trainees were introduced to production work during the second year of training in the central training workshop and went to the shopfloor only at the beginning of the third year of training, but today they start working on the shopfloor after the first one-third of the second year of training (see Fig. 2).

Figure 2:

Learning and working islands as adaptation areas for the transition to socialization in the company



Methodic-didactic dimensions of learning
Training department
learning and working islands
shopfloor
1st year of training
2nd year of training
3rd year of training
4th year of training
training workshop
company
Learning and working islands

- short preliminary phase
- what transition
- previous practical experience
- company-proximate adaptation area
- socialization step-wise
- responsibility step-wise

However, to make this procedure a success, a sound foundation must be acquired in the central training department preceding training on the shopfloor, because it is clear that some training objectives can only be taught to a limited extent in in-company learning venues. The main conclusion to be drawn from the learning island concept is that the development of team work has to be pursued even more systematically from the very first day of training. It should cover all training activities and promote self-managed and autonomous learning and working in the training team in line with prescribed goals.

3.2 New forms of learning and working in the Gaggenau factory of Mercedes Benz AG

Industry, and in particular the automotive industry with its suppliers and sub-contractors, has been undergoing radical changes for some time. The determinant factors here are acute competition on national and international markets, the shortening of innovation and production cycles, and an urgent need to improve the cost situation.

Almost all firms - including the Gaggenau factory of Mercedes Benz AG - have been trying for some time through diverse measures and approaches to achieve greater flexibility in order to safeguard competitiveness and raise productivity. However, in this context, highly automated technological concepts such as CIM solutions coupled with the vision of a factory devoid of human beings, no longer play the role they played as late as the mid-1980s. The highly networked systems were too complex, the vulnerability to disturbance too great, too low the availability of the machinery and the intelligence of the systems (Warnecke 1993). The availability of highly automated, capital-intensive machinery could not be ensured without skilled human labour. Therefore, the new approaches today put an equal emphasis on technical innovation and skilled human labour. This means that new work and organizational structures have become the focus of activity.

This also applies to the Gaggenau factory of Mercedes Benz AG which has been facing more intense competition for some time from two sides. From the angle of the external market this concerns the "Unimog". This product which belongs to the category of utility vehicles, has been viewed as a "loser" for a long time as can be seen in the colossal sales difficulties existing since the mid-1980s. On the other side, in the internal market, this concerns the production of gear box and axle aggregates which were mainly supplied to the lorry factory in Wörth. This in-house sub-contracting function came under considerable pressure of competition through the introduction of market-driven "customer/supplier relations".

For some time the Gaggenau factory has been trying to overcome this deteriorating competitive situation caused by price competition through internal reorganization strategies. The following principles prevail:

- A radical cost-reducing policy is being followed at all levels and in all areas. This affects investment in technology and the budgets for initial and continuing training.
- There is a moderate use of new information and production technologies. The possibility of introducing costly technical modernization was discarded.
- On the contrary, an attempt is being made to ensure productivity gains through optimal use of the factor "labour". Here the main feature is the elimination of vertical and horizontal division of tasks.

A central aspect of in-company reorganization in Gaggenau is a change in the structure of corporate hierarchies and processes. The aim is a sustainable improvement of the cost situation of individual production segments through decentralization and de-hierarchization. As a part of product logic, "centres" were created (Unimog, axles and gear box) and hierarchy levels were removed (factory management, group foremen). While other factories which introduced decentralization dissolved their central departments and assigned the respective operative and planning functions to small production units in the centres, Gaggenau followed a different course. The indirect quality assurance areas of engineering (production plan, work economy) and logistics were continued as central departments under the management of the centre. Maintenance alone is no longer a central function but has been partly split up.

Another field of reorganization is the new design of work organization on the shopfloor. This new structure which is termed "team work" throughout the company, envisages the elimination of vertical and horizontal division of tasks. Tasks which were formerly indirect such as personnel management, production control, process optimization, maintenance, logistics, quality assurance and production planning, are now assumed by partly autonomous, i.e. self-managing teams in production. This team work concept is also the point of reference for the use of young skilled workers. For several years now, young persons who have undergone in-house vocational training are employed in production after completion of their team work training. The salient features of this team concept are the following:

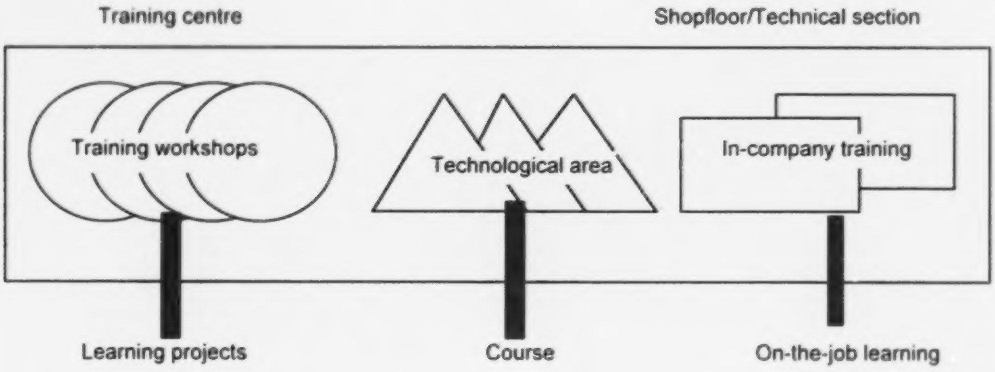
- It is conceived as an area-wide (production-wide) feature and not directed solely to the use of highly qualified skilled workers. The point of departure for the development of new work structures is existing technological and personnel structures and in particular the prevailing wage/output system. The degree of task integration in the teams is not fixed. It ranges from teams in which every member can perform every task (function-integrated team) to teams in which differences continue to exist in job and qualification profiles, even though the past division of tasks has not been maintained.
- The foundation for performance continues to be team piece-work, there are analytical assessments of individual workplaces and bonuses within the company's suggestion scheme to reward process and material improvements which produce added value.
- An integral part of the team concept is enough time for team consultations, training budgets and monitoring opportunities which will serve the further development of the team.

This change in traditional division of labour, where all tasks to be performed in the system are assumed as a whole by the team and then sub-divided internally in line with the prevailing work situation, means completely new demands on vocational training. Because, the aim is not only to train workers already employed by the company to perform these qualified tasks but, equally important, to set up a modern training system which can produce qualifications geared to the rising volume of tasks covering planning, scheduling, communication and cooperation. The training methods applied in the Gaggenau factory to meet these challenges are described in the following.[2]

Vocational training in the Gaggenau factory was originally concentrated in two in-firm learning venues: firstly, the occupation-specific training stations in the training center and secondly, the different workplaces located directly in or close to production. Already in the mid-1960s/early 1970s changes were introduced in the central training stations when an integral learning project was developed and implemented in the training programme (see Fig. 3).

Figure 3:

Differentiation of learning venues at the beginning of the development process



The envisaged target was to promote the acquisition of technical, methodological and social skills through learning in teams and to give a systematic structure to vocational training. At the same time "learning laboratories" were created in the training centre where technical competence (CNC, hydraulics/pneumatics, SPS, etc.) could be acquired through courses and experimental learning.

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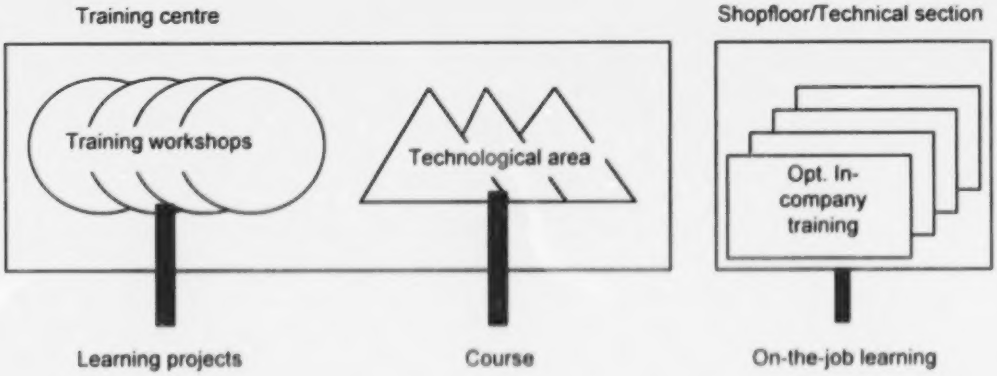
[2] The following section consists of extracts from a report written by Bittmann/Novak (1996), pp. 121-143.

In the course of time, training was concentrated more and more in the training center. One reason for this was that - given progressive rationalization - experience-based learning in the direct production process became a disturbance factor and a growing economic risk in the technologically ever-more complex production machinery. In order to maintain the link with actual production despite these difficulties, so-called in-plant training periods were organized in the last year of training. But, since the beginning of the 1980s it became increasingly apparent that these in-plant training periods were inadequate in terms of content and method.

That is why, in the mid-1980s, within the framework of a pilot project undertaken in collaboration with the Federal Institute for Vocational Training (BIBB), the in-plant training periods during initial training were systematized and lengthened (see Fig. 4).

Figure 4:

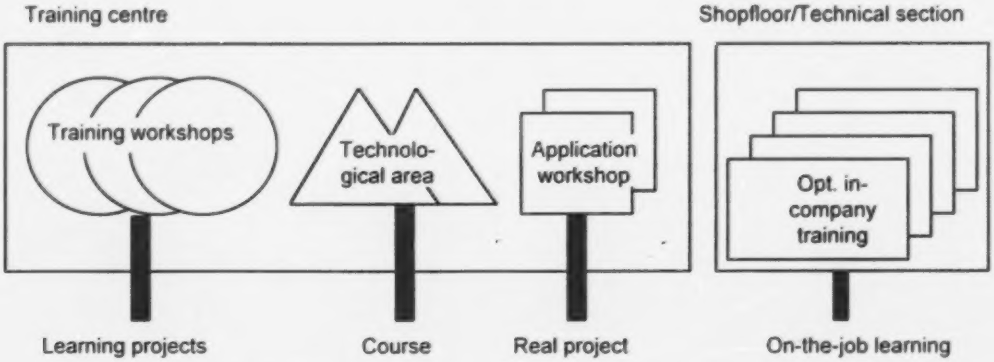
Optimization of in-plant training periods as the third step of change


Training centre
Shopfloor/Technical section
Training workshops
Technological area
Opt. In-company training
Learning projects
Course
On-the-job learning

However, this work-based learning in production still proved to be difficult in view of the then prevalent division of labour and the growing complexity of new technical machinery whose operation required a high level of qualification. As a result, an "application workshop" was set up in the central in-company training centre in the form of a CNC processing centre. This opened the possibility of reconstructing in-plant work operations in the training centre and providing experimental and experiential learning based on real work processes in the course of training (see Fig. 5).

Figure 5:

The application workshop as the interface between central and decentralized learning venues

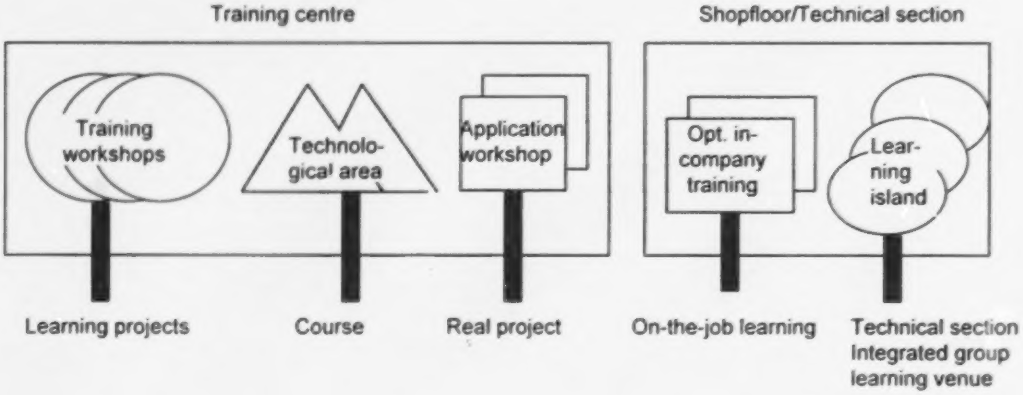

Training centre
Shopfloor/Technical section
Training workshops
Technological area
Application workshop
Opt. in-company training
Learning projects
Course
Real project
On-the-job learning

The results of this measure however proved to be ambivalent. On the one hand, closer links between learning and working were certainly established through the new learning organization in the training process and thus better pre-requisites were created for later work in modern workplaces. On the other hand, this development could not prevent a growing increase in the gap between training and working context. Therefore, at the end of the 1980s - more or less at the same time when the discussion on new forms of work organization commenced - the problem of the effectiveness of a training situation which was mostly detached from work processes in the company, was tackled. The staff responsible for training were asked to develop and test a learning organization in the Gaggenau factory of Mercedes Benz AG which would meet the requirements of work in modern industry and motor vehicle manufacture.

After a systematic benchmarking showed the direction in which changes in industrial work and motor vehicle manufacture would move and as, at the same time, it became increasingly evident that future demands on modern work processes in the motor vehicle industry could no longer be met through simulated working and learning processes in a synthetic training world, an innovative step was taken in learning venue development - supported once again by a pilot project undertaken in cooperation with BIBB. A new decentralized learning venue called a "learning island" was established on the shopfloor. The aim was to make these "learning islands" a systematic part of training so that trainees would have the possibility of autonomous and team-oriented learning and working on real job orders (see Fig. 6).

Figure 6:

The learning island as a new decentralized learning venue



These "learning islands" which were successively introduced in assembly, machining, maintenance and customer/after-sales service and, in the course of time, were used not only for initial training but also for continuing training and induction training of new workers, consist of a combination of working and learning. Real production job orders are processed. But enough time is allocated so that the team can, step by step, autonomously plan, execute and evaluate or improve this work. The intention is to enable not only the individual but the team as a whole to autonomously organize its work processes and jointly reflect learning progress so that experience and skills can be acquired.

After testing these "learning islands" for several years, vocational training in the Gaggenau factory has moved to a new plane. The integral parts of a modern training programme oriented to the future demands of work in the motor vehicle industry have become the elements of basic training which is made more effective through the systematic linking of learning to different learning venues.

As Fig. 6 shows, large phases of training are still carried out in training centres and the technical, methodological and social skills are acquired through training courses, autonomous execution of job orders and participation in projects. However, this training is combined with periods on the shopfloor where, through learning by doing and through guided learning and working in the "learning islands", the trainees have the opportunity of enhancing their knowledge and testing their skills in real working conditions. In line with this, the individual training phases and venues are not arranged in a linear mode but alternately so that it is possible to assimilate what has been learnt and to use it as a basis to acquire new know-how.

Parallel to the new trends in learning venues, change processes also occurred within the training staff. In the 1970s personnel development activities for full-time trainers concentrated on the acquisition, enhancement and expansion of skills to implement training measures, but in the first half of the 1980s, the focus shifted to the question of establishing who was responsible for the development of training and learning organizations. Here, the trainers had the task of reflecting on practical teaching in the central training workshops and also of supporting and shaping learning processes on the shopfloor and in the learning islands. These changes were backed by a team development process in which the trainers critically analyzed their situation and future demands. The outcome of this process was that more flexibility could be achieved in the training process and the pre-conditions were created for team work between the trainers.

The new decentralized learning venue, the learning island, created the need for a new type of part-time trainer, a person who worked in the island and also gave training. This required highly qualified skilled workers who, in addition to their technical skills and know-how, also had to have broad knowledge of the intricate interlinkages and complex experience of the overall technical system. The function of these skilled workers is to supervise the learning and work of the trainees in the learning islands and to intervene when tasks cannot be solved independently or when industrial safety or quality of work is endangered.

However, an essential requirement here is to create and foster cooperation relationships between the different learning venues. These interrelationships are shaped by the training staff, the trainers in the central training workshop, the technical trainers on the shopfloor or in the technical departments of the company, and the technical training staff in the learning islands. The purpose of this cooperation is a permanent exchange of information, the planning of training measures, control of the training programme and assessment of the trainees. Furthermore, this cooperation also promotes on-going evaluation and joint development of the training organization and training activities.

3.3 Vocational training and in-company innovations as factors of structural change in Europe: the FORCE survey of the motor vehicle repair and sales sector

The FORCE sectoral survey examines how the emergence of modern motor vehicles has changed the tasks in a motor vehicle repair shop and how this change is being handled by dealers and repair shops in collaboration with the manufacturers. This question not only addresses the competitive productivity and quality of motor vehicle manufacture but also the importance of after-sales service. From the second half of this century at the latest the latter became a decisive competitive factor. "Service and repair concepts have been developed jointly by European motor vehicle manufacturers and the trade associations. Subsequent quality standards are also implemented in non-European markets (e. g. the United States). These markets reveal whether European service concepts can compete with, for example, the Japanese concept on third markets. This will soon decide the fate of many European motor vehicle manufacturers." (FORCE Sectoral Survey). Given the growing importance of service concepts, the FORCE sectoral survey "Employment, Labour and Continuing Training in the European Motor Vehicle Repair and Sales Sector" can be taken as an example to illustrate some aspects which are relevant for European vocational training research. It has therefore been selected as a case study here because the issue addressed in this Europe-wide survey is the interrelation between technological modernization in the motor vehicle repair and sales sector, the design of work organization and the corresponding qualification concepts.[3]

Despite an exponential rise in technological innovations and the great variety of car models, the period spent by a motor vehicle in the workshop - as an indication of its repair and maintenance needs - has not increased but has clearly declined. This fact implies a dramatic change in the tasks of repair shops in the course of the last 40 years.

An interesting feature is a marked convergent trend in motor vehicle density in the EU Member States. The countries with the lowest density in 1987 were the ones with the highest growth rate in the last five years. However, there are divergences in the productivity of the motor vehicle repair chops (ratio of cars per employee in the motor vehicle repair and sales sector). If these two development trends are compared, it is seen that in countries like Italy, the Netherlands, Germany and Belgium, little structural change may be expected in the medium term because these countries have both high motor vehicle density and high productivity in the repair and sales sector. In countries like Denmark, France, Luxembourg, Spain and England, on the other hand, a distinct decline in employment in this sector together with a clear rise in motor vehicle density may be expected as substantial rationalization reserves exist in the field of service and repair (cf. Rauner/Spöttl, 1995).

The extensive introduction of new technical systems in the motor vehicle since the mid-1970s and the rapidly growing number of models led in the last 15 years to a change in the work done in this sector. This change is mainly determined by the technical development of the vehicle, the prevailing work organization in the repair shop and the equipment and tools available in the workshop (including apparatus for testing and diagnosis). The design of the tools has a considerable impact on the design of work organization in the workshops and thus on the changing tasks. The main technological change is to be found in the electronic systems of the motor vehicles. An analysis of the rise in manufacturing costs for motor vehicle electronics supports the assumption that the trend towards the electronification of cars and, consequently, the growing complexity of motor vehicle technology, will be intensified. The task now facing the motor vehicle manufacturers and the repair and sales sector is to master this accelerating complexity of motor vehicle technology in such a way that the maintenance intervals are lengthened, the repair requirements of the car are further reduced and the remaining tasks in the repair shop can be executed swiftly, safely and at low cost.

It is not only the electronic systems which generate technical changes in the motor vehicle. New materials, complex mechanical, hydraulic and pneumatic systems are also being introduced and have repercussions on the necessary development of qualifications. In addition to this, there is the further development of tools. Apart from changes in mechanical tools, there are now substantial innovations in testing equipment for propulsion systems, comfort and safety systems and engine management systems. The handling of computer-aided testers for engine management systems or laser testers for chassis measurement will soon be part of the daily routine in the repair shops.

The development of testers for the inspection of engine management systems is also influenced by the EU directives on the monitoring of exhaust fumes. The introduction of exhaust fume inspection II on the basis of EU regulations requires tester systems specifically adapted to this purpose. The skilled workers in the motor vehicle service sector have to be trained in the use of these new tester systems. They have to learn how to operate the testers, how to use the data provided by the manufacturers network and how to analyze the values displayed by the testers.

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[3] The following sections are extracts from reports written by Rauner/Spöttl, (1995), pp. 85-101 and Lichte/Rauner/Spöttl/Zeyemer (1993), p. 58 ff.

This implies tremendous demands on the motor vehicle service sector. Fig. 7 lists the technological and management areas which are mainly affected by these changes and their repercussions on job and qualification requirements in the sector. Three instruments are used to meet these challenges:

1. More advanced and continuing training
2. Reduction of job complexity through complex system technology
3. Intelligent Auto Maintenance and Service (IAMS)

Figure 7:

New technologies in the motor vehicle repair and maintenance sector

	Examples		Repercussions on the motor vehicle repair sector	Measures
(Micro) electronic control systems	o Ignition o Injection system o On-board computer o Check control o Service interval display o Engine management system o Navigation systems o Programmed seat adjustment o Heating regulation	o Transmission o All-wheel drive o Chassis o Power steering o Antilock braking system, ABS o Anti-slide regulation o Seat-belt tensioner o Airbag o Regulated 3-way catalyzer	o Need for specialized knowledge of (micro) electronics o Need for new measuring and testing equipment o New computer-controlled testing apparatus differs for each make of car o Many gear boxes have been designed as black boxes and can therefore not be repaired but only replaced	o Standards for the interface between electronic control machinery and computer-controlled testing apparatur o Teaching of basic knowledge of (micro) electronics o Training to operate new diagnostic and testing apparatus o Information on state-of-the art technology in motor vehicle electronics
New materials	o Synthetic materials - Body parts - Spoiler - Fender - Interior fittings o Galvanized body sheet	o Resistant sheet steel o Ceramics - Spark plug insulators - Portliner - Piston rod (future) - Catalyzers - Exhaust gas turbocharger	o Difficulty of identifying the synthetic material used o Special repair procedures for synthetics o Special painting techniques for synthetics	o Promotion of cooperation between manufacturers and repair shops so that new materials can be repaired properly o Information and training: Latest identification and repair methods
Complex mechanical, hydraulic and pneumatic systems	o New drive techniques (hydrogen, hybrid) o Multi-valve engines o Chargers (turbo, compressor) o Automatic transmission o Infinitely variable change-speed gear	o All-wheel drive o All-wheel steering o ABS and ASR o Shock absorber (Vario) o Conti-tyre system o Procon-ten	o Rise in the volume of knowledge o Need for specialized knowledge o Need for specialized tools sometimes o Need for modern testing and diagnosis technology	o Initial and continuing training of staff members so that they have updated state-of-the-art knowledge of technology
Impact on technology management	o Market penetration of new technologies - Advertising with new technologies for certain customer groups - Broader use of caralyzers	o Disappearance of the market for second-hand cars with no new technology	o New areas of activity o Repair potential of non-affiliated repair shops very restricted	o Training of staff members in repair techniques of new technologies o Monthly CD-ROM diskette to furnish repair shops with the required manufacturer-relevant data

Source: ITB Bremen

In many repair shops the traditional division of tasks and work is horizontal, based on the main systems of the vehicle:

- Motor vehicle electronics
- Motor vehicle mechanics
- Bodywork and spraying

While the bodywork and spraying section is often separated from the other areas (for industrial safety reasons), the two first areas are amalgamating into one. Motor vehicle electronics require intensive continuing training. The repair shops try to cope with this development in different ways. Because of the pressure of global competition for better quality, two models of work organization and continuing vocational training compete with each other:

- The tasks in the repair shop are divided according to specialisms and carried out by specialists who have received continuing vocational training for this purpose;
- Motor vehicle service is organized in teams as an integral task. To achieve this, not only must more workers get continuing training as all-round mechanics (with additional electronics qualifications), but they must also be trained for team work and interdisciplinary cooperation.

The first concept is more common - depending on the size of the company - but with increasing integrated motor vehicle technology and greater emphasis on knowledge of method, it stands in contradiction to the trend towards quality service stations. To a certain extent the continuing vocational training offer is a reaction to this specialization: specialists visit "their" special courses.

The second concept presupposes a high level of skills in the repair shop and increases the flexibility of work organization substantially. For smaller companies - and they will form the majority in future - this is of particular advantage. Furthermore, through this model of the all-round mechanic, it is much easier to implement the team concept. A team of three to five members is responsible for all repair and service work and undertakes it in direct contact with the customer. This leads to more customer orientation and customer satisfaction, it raises the productivity of the firm and improves the qualification level of the employees. Despite these advantages, this concept has only been introduced in a small number of repair shops.

Two parallel training concepts have emerged in the motor vehicle service sector:

- the "Allround-Model": the concept of training as skilled worker and master craftsman for all makes of vehicles;
- the "Specialist-Model": the manufacturer-based system of customer service schools, i.e. continuing training provided by the manufacturer.

Continuing training provided by the manufacturer has a long tradition. Today it is widespread in the motor vehicle service sector in both quantitative and qualitative terms. One of the reasons for this - despite progressive standardization in motor vehicle technology - is that the manufacturer-specific design of tools and workshops requires a great deal of manufacturer-specific know-how. In the meanwhile, however, because of the steady rise in the need for training - the central continuing training courses offered by the manufacturers are reaching their limits, which means that the additional continuing training required has to be shifted to the repair shops. Surveys undertaken in the context of the FORCE sectoral survey showed that in the case of some manufacturers, the volume of decentralized continuing training now by far exceeds the volume of central training courses (cf. Lichte et al. 1993). But, this decentralized continuing training in the repair shop - parallel to on-going service and repair work - is proving to be a disturbance factor.

The traditional method of organizing learning and working as two separate areas of activity can no longer be maintained in the motor vehicle service sector, especially as the computerization and electronification of motor vehicles is continuing unabated. The solution is considered to be the introduction and implementation of computer-aided working and information systems with a marked tutorial quality. These "Intelligent Auto Maintenance and Service (IAMS)" systems offer the chance of integrating continuing training as a permanent form of implicit learning in the work process. Two approaches can be followed for the implementation of this new generation of computer-aided working systems. The first approach may be called the "computer-aided programmed workshop". This concept contains a mechanic who, as machine operator, is more or less an appendage of the computer-aided information systems. The second approach may be termed computer-aided qualified team work. The developers of IAMS systems have proclaimed that more job flexibility and a greater adaptation to the qualifications and experience of the employees can be achieved in future through the expert system quality of computer-aided work systems. The tests used in the past only had rigid diagnosis programmes and thus lacked technical and work organization flexibility. But, when developing the new generation of computer-aided work systems, the developers will not rigidly stick to one of the two possible development paths. This means that the interactive structure of the computer-aided work systems and their self-explanatory abilities will offer many possibilities of using them as information and learning systems at the same time. The system can be used as a "tutor" and training system. This development does not prescribe qualification requirements. If the user has a high level of qualification the tool aspect of diagnosis technology will apply and will be strengthened in one line of development. If, on the other hand, the user has a low level of general and initial vocational training, the alternative line of development will take over: the machine guides the operator.

The two scenarios, the computer-aided programmed workshop and the qualified team work concept, are the two ends of a spectrum of development and design possibilities in the motor vehicle repair shops. They show that vocational training is not merely a dimension dependent on technological change, but that it is a design factor for the further development of the motor vehicle repair shops. All arguments seem indicate that a repair shop where the mechanic is the expert who uses the computer-aided work systems of the future as a tool and works in a customer-oriented team, has by far the more promising development perspectives.

The design of these systems has a decisive effect on the scope and quality of learning opportunities in the work process. The adaptivity of the systems to the prevailing level of knowledge and experience of the motor vehicle mechanic and, above all, to a rise in this level, is a vital pre-requisite for the successful introduction of tutorial work systems. Further research and development reaching far beyond a traditional technological development task is needed here if computer-aided tutorial work systems are to reach the high level of quality and adaptivity required for the solution of qualification problems in the motor vehicle service sector.

The predominant factors for the vocational qualification of employees in the motor vehicle service sector are the ability to understand economic interrelationships and to master the entire range of relevant measurement, testing and diagnosis technology. However, no clear directions can be given on how this training should be organized and at which level it should take place. The training will take a different form in each case depending on the internal work organization of the firm, the country-specific vocational education and training systems and the specificities of practical work in the company. What, in one case, may unquestionably lie within the responsibility of the motor vehicle mechanic can, in another case, be the domain of the foreman or the "service technician" or "diagnosis technician" with a customer service certificate. Thus, the question of horizontal and vertical division of tasks is of great importance for vocational qualification. At present - as studies in the motor vehicle service sector show - a large number of work organization models are competing with one another. They range from the team concept with employees who possess all-round qualifications to a distinct division of tasks where scheduling functions are located in distant centres with mainframe computer systems. It is however controversial whether the latter forms can offer promising future perspectives in the long term because, in view of increasingly severe global competition for better quality, above all, in view of the necessary orientation to the customer, team concepts prove today to be the superior work models for optimizing customer satisfaction.

3.4 Work-based learning in the reorganization of the process industry: two case studies from the Netherlands[4]

In 1992 the SCO-Kohnstamm Institute of the University of Amsterdam conducted a study commissioned by CEDEFOP which was the Dutch part of an EU research project on "The role of companies in the provision of qualifications: continuing training and effects on training of work organization in the company" (Onstenk/Voncken 1993). As a part of this study two case studies were carried out in the process/chemical industry. They relate to firms in which new forms of organization combined with new technology and computerization have recently been introduced thus leading to a new quality in on-the-job and work-based learning processes.

The two Dutch case studies give a good insight into the potentialities and problems of work-based learning and training in new forms of organization in vocational training and with respect to the technological and organizational characteristics of a sector such as the process industry. The examples also show that not only high tech companies with leading-edge technologies but also firms where process control technology plays a relatively minor role, can take steps towards organizational learning. The case studies outlined in the following represent a type of in-company development in technology, organization and changing jobs which contains some dimensions relevant for vocational training research. The process industry represents a sector in which rapid technological changes are taking place with a sharp rise in investments per job. The nature of the work is changing to a great extent: processing-oriented production processes characterized by work of a semi-skilled and unskilled nature are being replaced by highly automated production processes. This means that the remaining tasks consist more of abstract process control with great responsibility due to the risks of interruptions and the costs of stoppages. Furthermore, the situation is more difficult because the statutory provisions on environmental protection and labour protection regulations have been tightened and the demand for more product quality has risen. This was formerly a sector with a traditionally high share of semi-skilled and unskilled workers.

Traditionally, the work of process operators was mainly based on routine tasks. In many cases workers generally had a low level of training when they entered the firm and they gradually acquired the know-how required for the job through a slow and lengthy process. Thus, in the process industry, the starting position for work-based learning was at a low level. As the two following case studies will show, this pattern changed under the influence of automation and computerization: great emphasis is now being put on know-how and understanding of processes with regard to the product, the market, the customers, the machines and the organization. More weight is being attached to group organization of work with holistic functions and the integration of simple maintenance and quality assurance in operational tasks. The accent in vocational training is being shifted more to work-based and on-the-job learning processes against the background of technological and organizational innovation.

The *first case study* presents a pharmaceutical factory where the production control system for the bulk production of the raw materials for penicillin has been radically modified through computerization. This innovation contains two dimensions:

(1) Automation/Computerization

Process control has developed from mechanical to automatic including the introduction of remote control from a control panel. Thus, the former relatively simple executing tasks of the operators changed to a broad package of (all-round) tasks followed by a phase of expansion and specialization. Checking and planning tasks were added to the operators' range of activities. Whereas previously practice and understanding of the process were obtained through the work itself, by carrying out the task repeatedly, a reversal is now taking place: understanding of why something works in a particular way has to be acquired first before it is possible to intervene. Process knowledge has consequently become far more important. The required level of qualification has risen to a medium level. On this basis, subsequent on-the-job learning processes take place at a higher level. Experience of working with screens has to be gained in order to have an overall survey of the process. Because process control is remote and undertaken from the control panel, an important means of checking by direct sensory contact with production (vibrations, noise) disappears. This makes communication between the control room and the workers in the factory essential.

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[4] The following sections are extracts from an article written by Onstenk (1995), pp. 37-44.

(2) Quality assurance

A second important requirement is quality assurance. In the last few years quality projects have been carried out to improve the production process, partly as a response to the changed qualification requirements in production and partly as a response to market and customer demands. The goal is a results-oriented form of work where concrete targets for each product/market combination and the measurement data obtained by the team itself serve as action indicators. Great emphasis is put on the group responsibility of employees for high-quality products. This makes mutual communication processes all the more important.

These changes have given greater importance to the planned training measures in which work-based learning and training will play a growing role. This includes guided learning through in-company trainers, group learning and learning with a group leader as moderator. Because they now have more responsibility, the operators have developed a sort of "logistic control" going beyond the individual phases of the process. The awareness of quality of work has risen and they work together to find ways and means of solving problems in the quickest and most efficient way. Learning has become a natural part of the work and the acquisition of skills and competences in the group has been stimulated. The staff development policy of the company has responded to this by promoting all-round and specialist jobs and has created new advancement opportunities for operators. Previously, an operator could not go further than the level of all-round operator, whereas now he has the possibility of becoming a specialist through a combination of training and experience.

The *second case study* deals with restructuring processes in a firm which makes adhesives and bonding agents. In this factory which produces adhesives and bonding agents directly for the consumer market, radical changes occurred in functional structures and a reform of quality took place, however, without an extensive restructuring of production processes before-hand. Parts of the production process were automated but processing-intensive production segments and manually controlled production continued to exist. Innovation in this company mainly affected quality assurance and improvement. This change was triggered by market demands and tightened legislation.

A restructuring phase in which the team or task-group concept was introduced, preceded these innovations. This implied adding simple maintenance and quality control tasks to executing shopfloor tasks. Daily production planning was also assigned to the team. The result of this was more autonomy and variation in the work and a broader range of tasks. The outcome of this step was a higher need for process understanding and quality. These changes in work organization led to new forms of training. The emphasis now was on training on the job under the guidance of an experienced colleague combined with job rotation. This created career advancement opportunities through which a person can now develop from apprentice to an all-round production worker. This development is part of an informal but organized learning path where the persons concerned learn to carry out various tasks in the production process aided by superiors and colleagues. Through this they acquire greater process understanding, have more awareness of quality and develop planning skills. Together with this learning through job rotation, consultation in the team plays an important role. It stimulates exchange of experience and the discussion of problems.

In the second restructuring phase where the target is recognition based on ISO 9000 standards and compliance with stricter environmental and safety regulations, the emphasis is on formal training. Recognition as an ISO-qualified company requires a detailed description of tasks and functions in which risks and problem areas are also itemized. These descriptions are a sound basis for the development of workplace-specific training concepts. Training is directly geared to company practice and is given at the workplace or in its immediate vicinity. Special courses were developed in the company to improve basic qualifications (language, mathematics) and technical training (assurance of the targeted quality standard). The emphasis is on situative learning or learning through order processing. The trainees are given the assignment of surveying the safety aspects of their own workplace taking various aspects and criteria into consideration. They are also encouraged to ask their colleagues and superiors questions so that they can learn through this process of information. This interrelationship between training and work-based learning will help the acquisition of flexible skills and a broad range of knowledge and know-how.

Both case studies show that companies of different sizes can influence various dimensions of learning potential (see Fig. 8). The learning ability of employees is raised by a higher level of training and the development of active forms of learning. Learning ability is also enhanced through a work environment which stimulates learning processes through complex tasks, offers the opportunity to acquire experience of new problems, products and materials and enables social contacts. Additional learning potential is generated by a work organization whose foundations are more autonomy and participation of the workers. The resultant new qualification requirements lead to an increase of training effort and to a new type of learning process at the workplace and on the job. This means a need for more activities and aids that promote and support learning at the workplace and are integrated as far as possible in daily work practice. This is not simply a matter of getting training material which is closely linked to the workplace. What is more important is an expansion of learning opportunities in work itself and through communication between the workers.

Figure 8:

The learning potential of the work situation

- A. **Qualification and learning ability** of the employee
  - Training
  - Experience
  - Learning skills

- B. **Willingness to learn** of the employee
  - Motivation for learning
  - Active and passive willingness to learn
  - Resistance to learning

- C. **Supply of learning** at the workplace
  - Features of job
    - Broad content and vocational completeness
    - New problems, methods, techniques, products, etc.
    - Internal and external regulating opportunities
    - Good contact opportunities
    - Scope for shaping and decision-making

  - Working environment
    - Feedback and explanation by colleagues and superiors
    - Information, action, interactive computer simulation
    - Material equipment of the workplace

- D. **Supply of training** at the workplace
  - Structuring of learning opportunities
  - Participation in innovation
  - Structured on-the-job training

4. CHALLENGES TO VOCATIONAL EDUCATION AND TRAINING

The examples of changes in technology, work organization and training in firms outlined in Chapter 3 give a clear picture of the different strategies applied for the restructuring of companies. In some restructuring processes technical innovations were introduced within the context of conventional rationalization measures, there was only partial application of organizational methods such as Just-in-time, team work, TQM, etc. In other restructuring processes, technical innovations and organizational measures were used as instruments or integral parts of a systematic change to introduce new management concepts, styles of leadership and work organizational concepts together with new forms of personnel development and staff training. However, as can be seen from the case studies and other company surveys and analyses (cf. Hoss/Wirth 1996), there are indications that new modernization concepts are beginning to emerge which not only offer partial solutions for organizational development in the company, but consist of comprehensive "systematic rationalization" covering all corporate production and social relationships including the corporate environment.

The internationalization of the debate on new production and management concepts shows that Europe-wide there are identical corporate problems and a common search for patterns of solution which are particularly oriented to the strategies of successful companies in advanced industrialized countries. However, the adoption of proven successful modernization models - as the case studies show - clashes with specific national and corporate conditions and organizational principles of training and work.

Thus, some - less empirical - indications support the thesis that the globalization of world trade, the internationalization of markets, accelerated world-wide communication, the intensification of corporate networks and the approximation of technological standards necessarily lead to a levelling of national cultures, vocational education and training systems and the basic patterns of corporate work organization. Apparently, national education and vocational training systems and the basic patterns of corporate work organization have a tenacity which blocks the "one best way" which could be implemented independent of country-specific cultural and institutional characteristics. Despite the internationalization of technical standards and the globalization of markets, company-specific strategy plans for modernization are tied to rules which have to get general social acceptance and need the long-term consensus of the actors involved (Georg 1995).

Thus, highly differentiated development tasks arise for European vocational education and training research and the further development of vocational education and training in Europe. Because, although it is possible to define anticipated technological change quite precisely at a general level, this economic/technological change does not clearly show how the change process will develop at the level of corporate organization and personnel development and in the design of vocational training measures. On the contrary, consideration has to be given to the importance of corporate-cultural specificities in the modernization process and the role of vocational training in this context. On the other hand, it is evident that vocational education and training can make their own specific contribution to corporate innovation. It is therefore necessary to have comparative analyses which provide information on national and regional vocational training policies and, at the same time, show cross-sectoral development trends for a European vocational education and training policy. The latter will be discussed here.

As the company case studies described in Chapter 3 showed, through the generalization of knowledge and the globalization of markets, the technological level has evened out on a general plane in the different European countries. Radical changes in international competition compel companies to make more customized products with higher quality, shorter delivery periods and stricter adherence to deadlines. One response to these demands was the increased use of new technologies together with the computerized networking of administration, design and production. However, the substantial efforts made to set up fully automatic factories did not produce the expected results (cf. Chapter 3.2). The costs of these solutions were too high, and fast technological development led to the rapid obsolescence of systems which had been modernized at considerable cost and effort.

This experience led to a new direction for the solution of existing problems. Instead of complex CIM solutions, many small firms opted for small and overviewable production units in the form of production islands and production groups. They aimed at the replacement of Tayloristic work principles through more flexible holistic work segments and team assignments. The idea was to bring about a drastic shortening of throughput times, to reduce the inputs for work planning and CNC programming, and achieve simplified production control through team production in comparison to conventional workshop production. Furthermore, trans-corporate concepts of Total Quality Management (TQM) implied new quality assurance strategies which were directed not only towards an improvement of products and services, but also employees. Trends showed that workers at the operative level had to bear the responsibility for the quality of their products themselves (zero-error programmes), and that they had to be integrated more effectively in the corporate problem-solving process (continuous improvement process). Quality thus became an integral part of the performance process.

From the European perspective there is still little clarification of the problem how human resources can be promoted in such a way that the new forms of work organization develop into self-evolutive systems instead of having to be implemented from the outside (cf. Heidegger 1995). Here the decisive pivot is vocational education and training which has highly varied forms in the different countries of Europe. To a growing extent, permanent technological and work organizational innovations for the maintenance of "European competitiveness" are turning into challenges for the reform and further development of vocational education and training, challenges which contain a number of generally valid requirements above and beyond all national traits. This issue will be addressed in the following with some references to the trends of change in technology, work organization and training emerging from the four case studies.

4.1 Change in occupational and management skills in computer-aided production concepts and team-oriented forms of work

In principle, it may be assumed that, not only at present but in the foreseeable future too, computer-aided technology and conventional methods will co-exist side by side. Computer-aided techniques thus only make up a part of technical production processes but seem to be the prevailing trend. New techniques such as CAD, CNC, SPS etc. are developing into the standard for technical production processes or have already reached this level. They are in effective use either directly or indirectly in almost all workplaces.

Computer-aided techniques lead to new forms of work organization. Not only does skilled work become computer-aided skilled work but the overall demands on skilled workers become multiple through the introduction of the new techniques. The requirements include a high level of flexibility, broader qualifications for the installation and start-up of mechanical and computerized machines, the operation of more sophisticated control equipment, supervision, control, repair and maintenance. Conventional subjects such as mechanics, hydraulics, pneumatics, electricity have to be supplemented by new qualifications such as electronics, control systems, technical organization. The predominant requirement for employment in a computer-governed production process is a broadening of the foundations of several disciplines, e.g. mechanical engineering, electro-technology, electronics, computer technology and business management. However, vocational training at present does not give sufficient consideration to these interdisciplinary requirements. Vocational training measures will also have to contain the essential elements of the new work environment. This includes the self-evident use of the computer as an instrument for the planning, design, control and supervision of production, the integration of mechanical and electronic elements and the production and use of software (cf. Spur/Specht 1997).

As supported by studies on industrial sociology, scientific engineering and industrial psychology (cf. Sonntag summarized, 1996), a high level of overall availability of systems can only be obtained in organizational forms which include complex work tasks. The essential changes vis-à-vis traditional work structure are a three-fold reduction in the division of labour:

- the elimination of hierarchical division of work within a production process (i.e. the division of tasks between the machine operator, the swing-man, the maintenance man and the plant foreman)) is considered to be purposeful;
- the technical division of work between different production processes (in particular between turning and milling) is reduced or eliminated;
- the functional division of work between production and the preceding and following stages (such as preparation, toolsetting, quality assurance) is reduced.

These trends and the rapid obsolescence of specialized technical know-how have led to the increasing importance of the so-called extra-functional skills and competences in vocational training. These relate to personal skills (willingness and ability to learn, cross-sectoral thinking, grasping interlinkages, ability to take decisions) and social skills (cooperation and team work, communication skills and ability to tackle conflict). Together with relevant technical competence these skills enable a higher level of action competence and thus become essential pre-requisites for team-oriented work and control processes.

In the context of the use and qualification-promoting design of technology and team-oriented work concepts, the following trends in the further development of skilled worker qualifications - based on the interpretation of current research and survey findings - may be formulated (cf. Hoppe 1997):

a) Manual interventions in the manufacturing process have decreased as a whole.

b) Preparatory scheduling, planning and programming stages of the work process are becoming more important. This particularly applies to team-oriented production structures which are characterized by a reduction of vertical division of labour.

c) Perception and reasoning are required, so is subject-specific knowledge. Especially in the case of disturbances in complex production systems these cognitive skills gain weight.

d) There is a greater need for cooperation and communication between the workers themselves and between this stage and earlier and later stages of production because of the complexity of the machinery and the requirements of fault diagnosis and elimination.

These is empirical evidence of these trends in a number of case studies where this interpretation and organizational design in the introduction of new technologies resulted in corresponding developments in qualification. These are current studies on work science and industrial sociology from the United Kingdom, the Federal Republic of Germany and the USA; they deal with the activities of staff in Flexible Manufacturing Systems (FMS) in team-oriented production structures, with operators' activities in production systems using industrial robots, and with maintenance activities in flexible automated manufacture (cf. Sonntag summarized, 1990).

As the company case studies show (cf. 3.1 and 3.2), a stronger intellectual permeation of the work process is indispensable when dealing with automated machinery and its combination in flexible manufacturing units. In particular, activities such as diagnosis and elimination of malfunctions and faults are affected. This requires not only the individual worker and his specific knowledge but also an open exchange of information in order to solve problems collectively. Furthermore, flexible manufacturing systems need a high degree of task-related cooperation. Skilled workers no longer work as individuals at their machines but have to function as a team in optimizing production processes, ensuring quality, carrying out repair and maintenance work or diagnosing stoppages and rectifying them where possible. This configuration of tasks is of central importance in the case of lean concepts and presupposes occupational action competence whose components - technical, methodical, social and personal skills - have to be equally and comprehensively fostered through vocational training.

Distinct changes are to be found not only in the training requirements for skilled work but also in the technical and leadership functions of technicians and foremen (cf. Antoni 1994 and Sonntag/Schaper/Benz 1995). As both studies were based on small random samples, generalization is not possible, but the data gives indications of the general trends to be found in the quantitative and qualitative changes affecting the future management work of technicians and foremen (see Fig. 9).

Figure 9:

Technical and management tasks in the job activities of foremen and technicians in present and future work systems

Position	Technician in				Foreman in			
	present		future		present		future	
Technical, Management, Administrative tasks	work structures *(Sonntag/Schaper/Benz, 1995)*				work structures *(Antoni, 1994)*			
Production planning/ preparation	**	preparation of work	**	project management	-	-	*	contribute know-how
Production control	-	-	*	execute job orders	**	detailed control	*	delegate
Quality assurance/ management	*	implement	*	delegate	**	implement	*	delegate, ensure
Materials planning/ Logistics	*	plan. decide, procure	*	delegate	**	plan. decide, procure	*	delegate
Further development/ optimization of work processes	-	-	*	participate in problem-solving groups	*	eliminate deficiencies	**	initiate and support continuous improvement processes,
Administrative tasks	*	keep sick roll, time records	*	budget administration	*	keep sick roll, time records	*	budget administration
Selection of staff	-	-	*	co-decision	-	-	*	select, propose, advise
Staff allocation/ planning	**	decide, allocate	*	coordinate	**	implement, decide, allocate	*	delegate, coordinate
Staff development	*	induction, technical training	**	coaching moderation/ presentation training	*	induction, technical training	**	identify needs, on-the-job training
Staff care	*	appraise, discipline	**	advise, support, motivate	**	appraise, discipline	**	support, advise
Functions in/for working groups/ project teams	-	-	**	set mutual goals, arbitrate, pass on	-	-	**	set mutual goals, solve conflicts, secure

Legend: Time required for tasks (estimated): - not required; * small; ** significant

A detailed analysis of the comparison shows that:

- "the time scale of the technical tasks decreases (foremen) or rises slightly (technicians);
- In the newly structured manufacturing concepts, technicians are assigned more tasks relating to project management, processing of job orders and participation in problem-solving teams to optimize work processes;
- foremen delegate technical tasks (e.g. quality assurance, scheduling of material, process control) to the team. In future, the introduction of the continuous improvement process and its implementation will become important;

- Leadership tasks increase both in the case of technicians and foremen. An exception here is planning for allocation of workers which is delegated to the team;
- Personnel development and guidance of staff are a major component of leadership tasks. It will be important in future not to instruct the workers, but to establish their development needs, to advise, coach and promote them" (Sonntag 1996).

This implies a considerable number of new training requirements for skilled workers and technical middle management: On the one hand, competent workers are needed, on the other hand, learning arrangements have to be developed which will produce the necessary skills, i.e. self organization, problem-solving, reflective and collective action in teams. This means that, both in vocational training for skilled workers and in continuing training (foreman and technician level), the accent has to be put on self organized, personality-developing learning processes, if the new manufacturing concepts and organizational models are to be effectively implemented.

4.2 Training for experience-based working

Flexible reactions of companies to rapidly changing markets and customer wishes, high-quality products and continuous improvement, involve a decentralization of project responsibility and services orientation, and greater responsibility for processes and outcomes at the point of production. In order to perform the broadened range of tasks and more sophisticated control functions, the workers not only need a higher degree of autonomy but also cross-sectoral process know-how and process-related on-the-spot experience. The latter is gaining importance in the supervision and control of complex systems and in organizational optimization processes whose self-regulatory trends call for more design competence on the part of the employees. The essential component here is open operational actions where the elements and phases of work cannot be clearly delineated from one another and where their sequence cannot be definitively fixed before-hand, so that they cannot be memorized and recalled whenever needed. This means that operational actions in automatic manufacture - as many corporate restructuring projects have shown - have to be designed, executed and revised during the actual manufacturing situation on the basis of a high level of general technical competence, i.e. they are situation-determined to a great degree. The results of this is a highly dense sequence of vital operational actions which require intuitive decisions and daily creativity on the job, and also the possibility of recourse to experiential work in view of growing flexibility and frequently changing products, materials and procedures.

The same applies to commercial activities where the decisive factors are negotiating skills, ability to,coordinate processes with customers and suppliers and updated knowledge of the market. Increased flexibility to meet changing customer requirements, new market demands, etc. call for more experiential work which is aimed at exploring new and unknown situations and mastering unforeseeable work requirements. But the use of new information and control technologies in the work process restricts the potential for experiential action and acquisition of the necessary competences as computerized presentation and handling of concrete production processes narrows sensual perception of work. It also restricts the possibilities of developing and testing explorative work techniques in technical systems because of the high costs and risks involved. As a result, new forms of training for experiential work such as "creation of experience" acquire a new significance in in-company initial - and above all continuing - training and call for new learning arrangements. The first steps towards this are to be found in the simulation of practical production and administrative processes, above all in the establishment of learning islands and learning stations on the shopfloor where self-learning abilities and "creation of experience" are systematically promoted through pertinent teaching and learning aids.

In highly technological manufacturing processes, technical systems are increasingly replacing human inputs including control and surveillance functions. However, all technical systems for the automation of manufacturing processes reach certain limits beyond which they cannot replace human effort. On the contrary, the latter is beginning to play a greater role in the smooth operation of industrial plant as the competent intervention and the experiential action of employees can prevent stoppages and accidents, ensure preventive maintenance, etc. Concrete production processes are not absolutely predictable in practice. Daily routine on the shopfloor, even in highly technological processes, contains "imponderables" which can originate from the properties of the materials and procedures used and from the condition of the technical machinery and even from external influences (e.g. weather). The employees thus have the important task of recognizing such "imponderables" at an early stage and taking the necessary preventive steps to counteract irregularities and disturbances in the process.

The required quality of human input in "modern" work processes takes the form of qualifications which may be summarized under the term "experience-based work". This includes abilities like associative reasoning, a diffuse and complex sensual perception, a feeling for technical machinery, and competences which can usually only be acquired through many years of experience. But this is becoming increasingly problematic because of growing flexibility and constantly changing products, materials and procedures. Thus, the question whether the ability for experience-based work can only be acquired through lengthy processes in the job, or whether it is possible to produce this "experiential capability" and "experience" through learning, is having an impact on new requirements in vocational education and training. Because, it is precisely in the occupations and activities which deal with control, supervision and maintenance of highly automated plant that experience-based knowledge and experience-based action competence are playing a more important role - in the last resort, they determine how effectively expensive technical machinery can be used.

New forms of training for experience-based work such as "creation of experience" acquire a new significance in in-company initial - and above all continuing - training and call for new learning arrangements. The first steps towards this are to be found in the simulation of practical production and administrative processes, above all in the establishment of learning islands and learning stations on the shopfloor in which self-learning abilities and "creation of experience" are systematically promoted through pertinent teaching and learning aids. Through this, the basic experiential competences such as observation capacity, conscious use of concepts, sensitivity, attention to situations requiring discretion, etc. will be promoted, and ways and means of autonomously acquiring and evaluating experience will be found.

The important elements of this experience-based knowledge are:

- Knowledge of complex industrial plant must be acquired directing on the spot using "all senses".
- In order to understand and appraise the data on the screen in the control panel, it is necessary have a concrete visualization in the mind of the plant and the processes.
- Interventions to prevent stoppages cannot follow a fixed pattern. It is necessary to observe the reactions of the machinery and to act accordingly.
- When diagnosing disturbances and rectifying them, it is helpful to associatively recall former disturbances without, however, transposing these blindly to the current situation.

4.3 Integration of working and learning: new demands on learning technologies and a learning-oriented work design

The traditional path followed in vocational education in Europe - with all its national traits and differing characteristics - of defining vocational training and working on the job as two distinct areas with only external contacts and a separate organization of learning and working, is leading to a dead end. Growing competitivity requirements in the form of cost economies, higher quality and shorter timing, are at present compelling companies to undertake permanent learning, adaptation and innovation processes in order to remain on the market. The qualification of employees - in addition to technology and organization - is becoming a decisive factor for innovation processes.

This generates more training needs not only at the management level and in the planning and development departments, but also for workers in the operative fields and especially on the shopfloor. The swift development of technology and new work systems with more flexibility and decentralization to adapt to the changing market, imply more sophisticated skills to master complex operations and a refined structure of work organization involving the self-management and own responsibility of the workers. This expansion of the scope of technical and work organizational design not only makes it possible but, to a certain degree, even necessary, to make more consistent and systematic use of on-the-job or work-based learning for the occupational qualification of all staff and the promotion of corporate modernization processes. Because, given ever-shorter innovation cycles, qualification requirements have risen so steeply that the separate organization of learning and working in two different areas can no longer meet them (cf. in particular Chapter 3.3).

Thus, a new subject requiring European and national support has become central, namely, workplace-oriented initial and continuing vocational training (cf. BIBB 1997). As the case studies presented in Chapter 3 show, new concepts emerge in companies on workplace-related learning venues (e.g. learning islands, learning stations) and decentralized learning through multimedia technology. By linking work and learning, professional action competence is acquired under real working conditions and by stressing situation-based, experiential and design-oriented learning.

The link between work and training not only opens new pedagogical potential. In many situations it also enables a better adaptation of learning contents to job requirements and the work environment, it ensures a high degree of applicability of the acquired knowledge and know-how, and enables employees, with pedagogical support, to move into new task areas.

As all empirical studies specifically show, and as all authors specifically stress (cf. inter alia Franke 1993, Bullinger/Gidion 1994, IAO 1992), new technology and work contents do not inherently generate better learning chances with a corresponding motivation to learn on the part of the workers concerned. The act of training within the work process has a strong impact on work organizational processes and raises multiple questions relating to the new design of work organization: work processes have to be comprehensible and their linkages must be such that they can be readily grasped, work assignments must have enough scope for action and must be so varied that they enable the acquisition and overview of general know-how, work tasks must be prepared as learning tasks which permit autonomous planning, implementation and control of activities in communication with others.

Whether the above-mentioned learning-relevant job characteristics have a positive effect on learning during work also depends on the extent to which the structural pre-requisites (staff, technical and media equipment, networking with other learning venues) giving organizational support to work-based learning, have been created. Because, it is only under such conditions that forms of workplace-oriented training - which are being promoted all over Europe today in pilot concepts as they seem to facilitate the reintegration of especially endangered groups in the labour market (cf. Kloas 1996; and the experience of the EU pilot project: Model approaches in coordination of networks in the vocational education and training of women", BIBB 1996) - will offer a promising medium and long term perspective.

This renewed emphasis on learning in the work process also means a new relationship between learning technologies and a work design conducive to learning, as the FORCE sector study on the motor vehicle sector presented in Chapter 3.3 shows. This is because learning in the work process, as outlined above, is more than just "learning by doing" or copying what has been demonstrated. The expectations placed in programmed teaching material of the type conceptually developed in the 1960s and 1970s, have long given way to a more sobre realization that the effectiveness of programmed instruction for the solution of such training problems is very limited. Today, the focus is on the question of how to develop computer-aided work systems which, through a marked tutorial quality, will offer opportunities for implicit self-managed learning in the work process. Because, the design of these systems has a decisive effect on the scope and quality of learning opportunities in computer-aided work and information systems.

In this context a new, vitally important task arises for media research and development, namely, the need to design work systems from the media aspect in such a way that they can be flexibly adapted to the prevailing qualification level of the employee concerned, and at the same time, to design learning technology in such a way as to broaden the trainee's scope for behavioural and experiential action and facilitate a flexible situation-adapted training (Ross/Schenkel 1995).

Today, the development of flexible instructional systems in the 1990s, more sophisticated software and flanking audiovisual media permit a highly differentiated analysis and design of learning processes in computer-aided applications such as planning games, simulation or computer-based training. The range of available computer programmes enable multi-facetted modes of learning: learning as repetition (programmes of exercises), as an interactive and constructive process (tutorial programmes) or as explorative learning (simulation programmes). In addition to planning games, more simulation programmes are being used at skilled worker level, e.g. graphic/dynamic CNC-simulations, as a preliminary stage for the operation of complex industrial plant. Their learning properties lie in the cognitive field in the reduction of complex contents. Greater expectations for the more efficient use of computer-aided learning programmes are placed in the integration of expert systems and intelligent tutorial systems. These systems not only contain a knowledge component but also a diagnosis system which the trainee can use to broaden the foundation of his knowledge through interaction with the system. This enables an optimal control of the learning path (cf. Sonntag 1996).

However, much of interactive multimedia learning is still in a state of flux and only an interim assessment can be made at present. After a phase where it was extolled as the most promising solution for many training and continuing training problems (cf. Sommer, 1992), more impartial assessments of the pedagogical potential, the adaptivity, the speed of dissemination and even the cost-benefit ratio are gaining ground. Despite the undoubtedly astounding potential and capacities of computer-aided learning systems, which will certainly be developed further, people have realized that computer-aided interactive learning is still far removed from an "interaction process with inter-human communication qualities" (Hürther/Podehl 1992, p. 25) and that it involves a pre-standardized dialogue with a machine with only apparent and restricted individual control by the trainee. Despite this, the subject "Computer-aided and multimedial learning" has conquered a firm place in vocational education and training in the meanwhile and many studies and experts (cf. inter alia Prognos 1995) predict exponential growth in this field in the coming years.

On the other side it is evident that standards

- for hardware, interfaces, system components,
- for user interfaces and interaction possibilities and
- for didactic structures, methodical use concepts and media-didactic approaches

still lack clarification and are controversial (cf. Zimmer 1992), and that research still has many gaps because of rapid development, the enlargement of potential application areas in companies and the resulting obscurity of the market for learning programmes. Furthermore, a primarily technocratic approach may be observed in the development and application of interactive learning systems; this appears to promote a broader use of a more efficient education technology but, as a rule, it neglects curricular and didactic-methodical interaction (cf. Ross 1995). Here, particularly in view of the numerous support programmes at European level, there is apparently a great need for research on and development of the contextual and environmental conditions surrounding the use of interactive media (cf. Chapter 5).

4.4 Trainers learn - requirements for a new professionality of training staff

In the last few years initial and continuing vocational training - as seen in the previous sections - has undergone substantial expansion not only at the technical level (e.g. through the increased use of technology) but also in terms of training forms and methods. For many years a learning structure detached from the real work situation in terms of time, contents and organization was the characteristic element of initial and continuing vocational training, but today workplace-oriented forms of training are gaining ground. The emphasis here is on the manifold forms of the induction and briefing of workers, coaching, the structuring of learning processes in groups, media-assisted forms of CBT and guided learning with self-study materials.

These developments imply new challenges for those "teaching" in initial and continuing vocational training: the common denominator in the vocational education and training trends outlined above is a shift in the storage of technical knowledge which visibly reduces the half-life of usable knowledge - also for trainers - and makes quick adaptation of new knowledge indispensable. Other common features are new demands on the methods for transfer of know-how, its variability and further development (cf. Dupont/Reis 1991). Apparently, these aspects are neglected in the discussion of modernization requirements in vocational education and training - especially in terms of the interaction between technology, organization and qualification. It is becoming increasingly evident that

- given the rapid changes in technology and (work) organization, there is a growing need for information and knowledge which greatly augments the learning effort of trainers if they are to possess the knowledge required for competent handling of new technologies and technical-organizational issues;
- quick acquisition of knowledge is limited because of individual assimilation capacity and also because of insufficient provision of institutional continuing training for trainers in initial and continuing vocational training;
- the "what" and "how" the trainers themselves learn remains linked to personal communication and an intensive exchange of experience;
- the knowledge of technical and work processes required for vocational training can only be developed sufficiently if the trainers are involved in the innovation processes in technology and work and take part in shaping them;
- new forms of training like workplace-oriented learning, not only imply higher demands on the design of knowledge transfer, but that
- the increasing involvement of new "target groups being not familiar with learning" requires more individualization of learning processes and a socio-pedagogical orientation in "life-long learning".

While, in the last few years, more attention has been directed to the deficits, learning requirements and learning problems of individual target groups in initial and continuing vocational training, this has to date only been done partially for the trainers (with the exception of some recent international comparative studies initiated by CEDEFOP). What and how the trainers learn is seldom examined. Precisely in the case of this occupational group one is prone to think they know enough about learning as they have to deal with it every day. Far from it. If the continuing training wishes of training staff in vocational education and training are examined, the desire for a broad-based provision of continuing technical training is expressed as often as the desire for continuing training in pedagogical and psychological areas (Harke 1994; CEDEFOP 1994). A glance at the teaching/learning situation in vocational education and training and the qualification of the training staff explains why.

As outlined above, the forms of initial and continuing vocational training gaining ground today are process-based and adapt continuously to changes in tasks and organization. The didactic method sought is open teaching processes which are linked to systematic learning. This requires changes in the tasks and role of the training staff. The essential requirements today are to design initiation processes and induction measures in such a way that they are conducive to learning, to shape group processes according to the given situation and to give a development-promoting coaching to teams. More competence is required to identify priority training needs in concrete work and change situations and to develop the necessary measures.

These new requirements in shopfloor and workplace-oriented initial and continuing vocational training not only imply growing demands on the professional know-how of the training staff but also presuppose a new methodical/didactic orientation. Instead of one-sided transfer of knowledge through the trainers, the working and learning process is shaped by the trainees who channel their experience and problems into the learning situation and thus directly articulate their training needs. In terms of method, this leads to learning situations where the traditional form of instruction is replaced by an equal dialogue between the teacher and the learner. This, however, can be undertaken with success only if the training and continuing training staff are given technical, pedagogical and social preparation for this task.

Knowledge of the qualification profile of training staff in vocational education and training is characterized by uncertainty all over Europe. A large number of historical influences, linkages with other sub-systems in society and, not least, status and remuneration issues play a role in the professionalization of instructors, teachers, trainers and continuing training staff (cf. Selka 1995). As, in the individual EU member states, these factors have given rise to different structures which are difficult to grasp as a whole, only general principles can be presented here.

One of the characteristics of training staff in vocational education is a considerable difference in the degree of professionalization of trainers in initial and continuing training. As initial training is regulated by legal provisions in almost all European countries, the conditions of admission for teachers and trainers are also subject to precise regulations. There are contextual conditions which govern the enforcement of these regulations and enable the establishment of certain minimal requirements which are the pre-condition for authorization to exercise the occupation. On the other hand, in most cases the numerous continuing training schemes are not subject to legal provisions and consequently, the teaching activities of persons working in this field - whose professional origin is highly diverse - is, as a rule, not regulated: "In the heterogeneous field of continuing training there are no formal provisions which regulate the conditions of admission to trainer activity and the training of trainers. This particularly applies to training staff in the companies" (Dupont/Reis 1991). Thus, in continuing vocational training, the teachers are often professionals with experience in teaching. They seldom have pedagogical training or training in adult education.

Similarly, the large number of part-time trainers working in initial and continuing vocational training mostly possess occupational know-how and practical teaching experience. This corresponds to the demands of educational institutions which mostly lay emphasis on technical knowledge rather than on the didactic and pedagogical qualification of the training staff. Proof of technical qualifications can generally be shown by a vocational or educational certificate and relevant job experience.

A similar qualification profile is to be found in the case of full-time and part-time trainers and continuing training staff in the companies. Here, in addition to technical knowledge, specific occupational experience is also to be found, but this cannot be taken as an equivalent for basic pedagogical training. Even if, in this group of trainers, the accent is on the transmission of skills in practical training, they often have to establish the link between practical know-how and theoretical knowledge and pass this on to specific target groups. This implies a growing need not only for knowledge of new technologies but also pedagogical competence to motivate employees, to encourage persons "not familiar with learning" and to help trainees with the solution of problems. Today, in view of constantly growing technical, methodical and, above all, pedagogical challenges in initial and continuing vocational training, it is becoming increasingly urgent for the training staff to keep pace with these developments. This means that teachers, too, need continuous learning. It also implies new demands on the cross-sectoral further training of teaching staff with the emphasis on pedagogical and psychological aspects.

4.5 Modernization of vocational training under change conditions

Chapter 4.1. to 4.4 described the essential requirements needed to develop the contents and organization of vocational training in relation to the level of in-company innovations in technology and work organization. However, as already stated earlier, there is virtually no analytically or empirically substantiated basis on which to answer the question of the extent to which new production and organizational concepts have been implemented and disseminated and, even more, the question of their advantages and disadvantages in terms of work economy and occupational pedagogics. This also means that it will be very difficult to assess further perspectives because there are no systematic European and/or international analyses of the potential of new production and organization forms. Recent analyses, like the one undertaken by ISI for Germany, based on a survey of enterprises (cf. FhG-ISI 1995), show that the impact of strategic measures in the companies is greatest when the value-adding chain is restructured. The most common measures are segmentation of production, less depth of production, rationalized flow of materials and Just-in-Time-concepts. In contrast to this, a vast reservoir of unexploited potential is still to be found when it comes to the introduction of new work organization and personnel management forms. However, these findings do not seem to reflect a specific German problem, as case studies and qualitative sub-sector analyses from other industrialized nations in Europe show. It may be assumed that, in other countries too, it is not so much the technical aspects (such as a lack of flexibility in production units) which impede the application of new production concepts, but rather the following factors:

- the existing technical and management staff structures which impede the introduction and efficient use of new forms of production and work, and
- the fear of incalculable risks arising from the implementation of new production and innovation concepts.

Against this background, radical restructuring is seen as a menacing innovation rather than a new chance for the continuing success of the company under conditions of change. If no success is achieved in eliminating these impediments, some tremendous opportunities for maintaining the competitiveness of companies in Europe will remained unutilized. Recent findings from a German survey of characteristic productivity, cost and quality figures of companies show that:

- companies which replaced specialized job segments for their employees with a broader range of job content, achieved 9.5% more added value per employee;
- companies which introduced team work have an added value 8.5% higher than companies which continue with the traditional forms of individual work;
- companies with decentralized capacity planning have a productivity level which is 17.5% higher than companies with centralized decision-making structures;
- companies which have switched from the performance production principle to product line-oriented manufacturing segments, are 7% more productive than companies which have not;
- companies with quality circles have a productivity level which is 11% higher than companies which do not have this form of quality improvement.
- if companies have introduced several related elements of the new production concepts concurrently, the productivity effects are even higher: where, for example, team work combined with an expansion of job contents and decentralized capacity planning of production segments has been introduced, the productivity lead vis-à-vis companies which have not introduced any of these elements, amounts to more than 30% (cf. Lay/Mies 1997).

As this comparative study shows, the economic superiority of new production concepts is mostly related to changes in work organization and staff development. The figures prove that the most effective and successful step is the introduction of group work or team work together with a new design of work tasks and job content and a new regulation of responsibility and decision-making structures. But, these effects can only be achieved - as seen in the case studies of this report - when traditional patterns of thought and behaviour are intentionally modified and new structures of responsibility are established and developed through intensive and sustained training processes.

The fact that the greatest unused potential continues to lie in the areas of work organization and staff development is an indication of the challenges facing vocational education and training. The task of developing the contents and forms of vocational education and training in such a way that they not only adapt themselves, as at present, to technical and organizational change but, moving beyond these limits, assume the contours of an autonomous design element for structural innovations, is not a task which can be left to the initiative and training efforts of individual companies. Because - to cite a German study once again - when the question at hand is to assess which locational factors are vital for the maintenance of value-adding activities in Germany, the company puts labour market supply first, quite definitely before other infrastructural pre-requisites (cf. Research Centre Karlsruhe 1997). This positive assessment refers most frequently to technicians/engineers on the one hand, and the competences and potential of skilled workers on the other.

That it why it is of great socio-political importance to maintain and safeguard these positive structural pre-requisites. In view of the challenges of globalization and dynamic technical and organizational change, this entails a targeted development of initial and continuing vocational training, precisely at the social level.

The implications of structural change today are: a forceful drive towards worldwide economic integration, dynamic acceleration of the evolution of technology and productivity, dissolution of classical production, service and market structures, and the corresponding loss of jobs and employment opportunities. But the outcome of structural change is also new and different areas of employment and activity emanate. However, as these are just emerging, they are only perceivable as starting steps and vague outlines. We can only speculate on the new areas of activity which will emerge in the knowledge-based, information society of the future and the quantity and quality of employment opportunities they will offer. The challenge lies in mastering and shaping the transition.

Shaping the transition means setting the course for the opportunities of the future. This applies both to the classical industrialized nations and the dynamically developing newly industrializing countries. Training for qualification plays a decisive role in the setting of this course. Never before were the competences and the skill development of workers such an essential design factor for mastering structural changes in the economy as they are today. Competence and professionality are the essentials of a workforce open to innovation and vital pre-requisites for the transformation of old and the identification and expansion of new areas of employment and activity.

The central task in the modernization of vocational education and training is to create and develop structures which help persons, companies, enterprises, social organizations and institutions to

- cope with the dynamic movement of structural change and the transition to a knowledge-based, information society,
- remain capable of innovation and development under the conditions of change and uncertainty.

In order to achieve these goals, it will be necessary to initiate system developments in vocational education and training which will have an equal impact on the shape of initial vocational training and continuing vocational training. One means of solving this acute problem is to set up initial and continuing training courses with dynamic qualification profiles, such as those being used today in Germany and other countries in the conception of new skilled occupations requiring initial and continuing training (Lennartz 1997). The structural characteristics of such dynamic qualification profiles are:

- common core qualifications - differentiated professional qualifications;
- differentiation according to disciplines, areas of activity/technical fields;
- orientation to customers, business processes and services;

- orientation to real work processes and projects instead of course instruction, the linking of systematic subject knowledge and a process-oriented approach both in the school-based and in-company part of training, a holistic perception of tasks.

They offer the possibility of creating a structural link between initial and continuing training, and offering skilled workers the option of enhancing their competences through further qualification for related areas of activity.

The possibilities of combination and variation in the design of the competence profile contain the potential of reacting flexibly to permanent changes in occupational requirements, of effectively coping with the fusion of qualification areas and thus mitigating the pressure of adapting to the latest changes.

This systematic link between initial training and expansion of competences, whether undertaken within an integrated initial and continuing training concept or through other - still to be defined - procedures, opens the perspective of

- reacting purposefully to the growing need for new patterns and combinations required for specialization in the narrow occupational field, for qualification for new tasks and for career advancement;
- coordinating the components for enhancement of the competence profile with specific needs in the individual occupations and activities, sectors or businesses and extending them in a flexible manner;
- securing the necessary degree of transparency for companies in their use of the added qualifications of their workers;
- giving young persons and young skilled workers clearly defined options for an attractive career development, and giving skilled workers with professional experience guidance and support for transition to new fields of activity and employment;
- securing, for educational establishments, the efficiency, quality and market access of their services through standards defined on the basis of needs.

5. CHANGING TRENDS IN TECHNOLOGY, ORGANISATION AND QUALIFICATION AS THE FOCUS OF VOCATIONAL EDUCATION AND TRAINING RESEARCH

In the preceding sections some universal aspects of the development of vocational education and training and the innovation trends required were discussed. In the following, some of the current challenges (derived from the foregoing) facing European vocational education and training research will be summarized.

5.1 Recommendations for a change of perspective

The forms and content of work are subject to rapid change - especially in industry - which is closely related to the introduction of computer-aided technologies and is greatly influenced by the economic, organizational and cultural principles of corporate rationalization. The examination and description of these influences was the main focus of interest in the analysis of industrial work. In this approach, objective work requirements are identified with technology use and organizational frame conditions as the point of departure. In this research pattern, the way in which employees deal with these requirements, i.e. their real experience and competences, is given the value of a dependent variable. Without wishing to disqualify this method, such an approach is not really adequate for the discussion of the links between technological, organizational and qualification changes in view of vocational education and training research. Emphasis has to be put on a research perspective in which research on vocational training does not simply follow an adaptation-oriented approach, i.e. does not merely identify the objective training requirements arising from the use of new technologies and changing work conditions. It is necessary to have a different research perspective which analyses the extent to which initial and continuing vocational training acquires its own inherent significance in the interrelations between technological development, changing tasks and occupational skills.

The case studies show that the national vocational education systems in Europe offer a number of specific approaches for corporate innovation requirements and organizational development processes. But it is also clear that the integration of in-house and external knowledge encouraged in a learning organization calls for professional and social skills on the part of the employees which enables them to communicate with others beyond the boundaries of their own work content and experience, and to incorporate the perspectives of other work areas and the necessities of changing conditions in the fulfilment of their own tasks. What is also required is an attitude which makes the employee interested in new internal and external scientific/technical developments and leads him to see how they can be applied in his own field of work. Neither the in-house nor the external training institutions are sufficiently prepared to give this type of training. But these are the demands which will have to be met by future concepts of initial and continuing vocational training. Traditional "demand-oriented" personnel development derives initial and continuing vocational training needs in a reactive/adaptive manner from the difference between existing qualifications and new qualifications (arising from market trends and technological developments), and concentrates mainly on the enhancement of technical knowledge, and is therefore becoming more and more inadequate.

In this situation, vocational training research has the task of drawing attention to synergetic forms of rationalization and modernization, i.e. to the balanced and dynamic development of the components "technology, organization and qualification". This research perspective alone can offer the means of grasping the interlinkages between technology, organizational development and vocational training against the background of different and varied means of access to the contents and method of the nucleus "qualification and training".

5.2 Impulses for comparative international vocational training research

The convergent trends to be observed in work organization against the background of growing internationalization of market competition are backed by a technology which only varies slightly at a general level and apparently has little visible impact on vocational training and work design strategies. At the same time, comparisons in various countries of Europe show that - because of very different traditions - very different vocational training systems continue to exist. Comparative vocational training research should examine their specific strengths to produce innovative impulses for companies and development processes. In terms of method this means accentuating the "the entire functional range of macro and micro levels as the basis for comparison" in comparative international studies, i.e. to include the various industrial contexts and their incorporation in macro structures, and to extend this perspective of vocational training research (cf. Lipsmeier 1997).

Against the background of the need for more innovation in vocational education and training, questions relating to didactic methods in new training processes, their organizational forms and their integration in the learning environment gain importance in comparative vocational training research. Priority should be given to two aspects: firstly, the greater need for differentiation which will help to develop individual initial and continuing training paths; secondly, the need to define and describe learning potential in work processes and to find ways and means of making more use of available information and communication technologies for learning. From this perspective, questions relating to the integration of working and learning, flexible possibilities of coordinating learning venues, the promotion of forms of self-organized learning in initial and continuing training, should also be the subjects of research; so should the appropriate design of environments conducive to learning and the qualifications of vocational training staff.

One of the shortcomings of research projects which try to systematically investigate the interrelationship between innovations in technology, work systems and vocational education perspectives, is that they focus on industrial development processes; this means the accent is shifted to change processes in large companies. It was possible in the last few years to gradually introduce research projects which turn their attention to new challenges in small and medium enterprises, but there are still considerable research and knowledge deficits in this area, even though the need for research appears to be most urgent here given the developments and problems emerging in vocational training.

5.3 Need for interdisciplinary vocational training research

European vocational training research acquires a new emphasis from an approach which attempts to incorporate research in a social dialogue in international research networks (as the FORCE Sectoral Survey tried to do for the motor vehicle repair sector). In this context, vocational education policy must be seen in connection with economic and industrial policy and also social and labour policy. Vocational training research is dependent on cooperation with other research activities in these fields. What is required is interdisciplinary research which links the analyses of initial and continuing vocational training close to analyses of work design and industrial-culture parameters.

Attempts to link reforms in vocational education and training more closely with innovations in technology and work, reveal the growing importance of "on-the-job learning" and the rising need for workplaces which support learning. If, today, there is a general consensus that industry in Europe in the 21st century will need intelligent workers more than anything else, then the question of how these workers can use and develop their knowledge cannot simply be passed on to an education and training system which is far removed from daily life in industrial production. The decisive factor will be the design of the workplaces and the technical systems as a whole. Apparently, there are forms of workplace design which support learning and there are other forms in which "de-learning" is programmed. The vital question, therefore, is what design solutions can be found for computer-aided work systems so that they generate the maximum learning effects. As this is very closely connected with the question of plant architecture and control technology, many interesting areas emerge for interdisciplinary research in the field of vocational education and training.

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COSTS AND BENEFITS OF VOCATIONAL TRAINING

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SUMMARY

In economic terms vocational education and training is always an investment in human capital. It only pays when the costs of the investment are at least covered by its return in the broadest sense (benefits). If the benefits of an investment in initial and continuing vocational education and training are greater than the costs, then an increase in prosperity will be the outcome for the individual and, under certain conditions, for the economy as a whole. Investments of this kind increase the GDP, promote economic development and increase tax revenues for the state.

Decisions by the individual to invest in vocational education training or by a company, state or a non profit institution to offer VET and/or pre-finance it are always taken in a situation of uncertainty. Erroneous decisions and mis-investments cannot therefore be ruled out. For the individual and the national economy, decisions of this kind should be taken as efficiently as possible and should avoid mistakes. This situation is a commonplace but political and sometimes even scientific discussions fail to notice this fact. People miss to see that decisions on investment in vocational education and training, their financing and subsidising are genuine "entrepreneurial" decisions taken on the basis of information which has the character of market knowledge, which cannot therefore be generalised. Furthermore, decisions of this kind are based on subjective, expected costs and returns which cannot be objectified nor be scientifically recorded - unless in the form of non decision-relevant ex-post consideration.

If this is true, the risk of an erroneous decision and of a wrong macroeconomic development in the formation of human resources in conjunction with given natural resources depends to a major degree on the institutional conditions under which those decisions are taken. Investments in vocational training tend to fail, the less the decision-makers know about the costs and returns (information deficit), the less they have incentives to inform themselves about the costs and benefits and the more institutional conditions allow those concerned to pass on the costs to other members of society, and to appropriate the pecuniary and other benefits themselves or, in the reverse situation, the more others are in a position to harvest the benefits without bearing the costs.

Typical weak points in European education systems are

- the lack of transparency in costs and performance of the various schools and universities (partly except private ones) as well as their initial and continuing training programmes,
- the lack of incentives and preconditions of schools and universities to provide information about costs, performance and expected returns.
- Furthermore, depending on the system, there is a lack of information concerning the transition from in-school education and training to an occupation,
- over-investment in occupational training with systematically (caused by institutions) excessive returns compared to costs and vice versa under-investment in occupational training with generally excessive costs (for instance in Germany),
- and a lack of incentives to estimate the returns on public qualification programmes and subsidies.

The typical consequences are mis-investments on a large scale, clear distortions between the different training levels and courses of VET: over-investment in school (upper secondary level) and university education compared with in-company initial and continuing training, long duration of study, trend towards over-investment in public qualification measures compared with private ones as well as over-investment in close-up instruction which is expensive but free for the individual compared with distance learning.

So far there are no prospective cost-benefit analyses of vocational education and training in a broader sense.

The numerous ex-post calculations of educational returns, of impacts on wages, income, employment, growth and innovation may be useful as instruments to measure the success of state subsidies and the financing of training investment. However, they cannot be directly used as a decision making basis for the subsidies to be given or financing to be granted. Furthermore, they do not enable us sufficiently to calculate future returns, wages, income, productivity and growth effects of VET investment or of certain educational courses. Talent, social origin, influences of practical vocational and other experience, the distribution of productivity and income returns to qualified work and real capital, particularly in the case of technical innovation or changes in work organisation, and the missing statistical basis in order to distinguish fictitious increases in productivity from real ones (for instance in the case of labour displacement, the demarcation of returns in terms of income which have to do with vocational training and returns which can solely be attributed to a formal certificate as the entry prerequisite for closed labour markets or monopoly pensions resulting from market power - all these are largely problems which have still to be tackled in a satisfactory manner. There are still grounds for believing that in European countries the main education expenditure on schools and universities has no positive effect on economic growth. However, the main weak point is: they are neither helpful for the individual as the investor or person wishing to undergo VET when choosing between the different VET alternatives, nor for the school or university supplier, when it comes to deciding on the contents and scale of training courses. In-company VET and the system of dual initial and continuing vocational training offer major advantages.

Furthermore, ex-post calculations of returns, growth and employment effects cannot help state bodies when it comes to substantiating subsidies or the financing of specific VET investments. They cannot explain what type of education and what scale is required by industry and public administration or which one helps to reduce the risk of unemployment, to promote innovation or to increase productivity.

Social returns or positive side effects of training investments are only partly to be expected There may, however, be social costs and returns. VET does not in itself promote positive side effects, such as behaviour in line with the law nor does it promote health or "rational" consumer behaviour. On the other hand certain training contents in respect of specific situations and life phases may indeed have a positive moral effect by increasing resistance to criminal behaviour or by means of the formerly granted "school certificate" by at least preventing certain individuals from slipping into criminality or helping them to "cope with" a specific life phase ("depository function") during which an inclination to criminal behaviour is stronger. The reasons for criminality as a rule are not a lack of formal education but rather limited economic and social opportunities and deficits in the family. In the case of additional educational programmes, the respective available alternatives must therefore be weighed up such as the creation of additional jobs e.g. by means of deregulation, increased assistance and preventive measures in the case of dysfunctional families during childhood and adolescence or deterrents by means of more severe penalties.

Initial and continuing vocational training is organised from the angle of costs and benefits and therefore offers allocative advantages in the dual system. Companies do indeed consider, in parallel to the investment decision, their own initial and continuing training programmes and their pre-financing vis-a-vis other alternatives such as recruitment of already skilled workers. Only to a certain extent can they consider this as investment to the extent that fixed asset investments must be made for initial continuing and vocational training. The reporting of staff know how as assets is not admissible in terms of balance sheet law and has its own limits since the companies do not own the knowledge and skills of their staff. Within the framework of contracts, as a rule employment contracts, they simply have a claim to the supply of the know how in the form of qualified work i.e. in legal terms a contractual claim. At best they can ensure the use of qualified work by shaping the remuneration system and by imparting company-specific know how within the framework of in-company initial and continuing training and in this way reduce the desire of their workforce to work elsewhere.

Increasing decision-making efficiency and improving the cost-benefit ratio of VET depends to a major degree on the institutional framework. Since there is no definitive VET, which can be broken down into a number of training commodities and strands and combinations thereof, and since VET in itself does not have the desired effects on wages, income, employment, productivity and growth, it is very much a matter of creating the preconditions for "correct" and, if possible, high net returns through VET decisions or of improving them. This applies all the more so when it is to be assumed that new major challenges will be imposed on the VET system in future and that it will take on increasing importance compared with the human resources stock of an economy for the following reasons:

- globally available scientific and technical knowledge can only be used and applied in products and production process when the complementary factor to knowledge, work, is able to understand this knowledge, to process it, develop it on and use it practically;
- the life cycle of products and services and of production procedures has been considerably shortened and further reductions are to be expected;
- research and development, innovation, quality assurance, services tailored to the individual customers will be on the increase given the global conditions;
- human assets on a qualified and highly qualified level will become economically obsolete much more rapidly than before.

If these considerations apply, then the return on investment in VET depends very much on whether the requirements in respect of the various performance processes of industry and their changes by means of technical and organisational progress are recognised as early as possible and are incorporated into training decisions since more than ever today it is important that the talents and capabilities of the individual are correctly assessed and that they are being qualified for tasks and functions in industry in which they can do the best for themselves and other members of society. This demonstrates that today more than ever what are important is the quality of the VET system rather than the qualifications of the workforce. What will matter will be the creation of preconditions which reveal the true costs and benefits of VET in order to improve the decision-making bases for all those concerned (owners of human resources, state and companies as the providers of subsidies and funds, schools, universities and companies as the providers of VET, state supervisory bodies etc.).

Only when we succeed in more rapidly processing new theoretical and application-oriented knowledge thanks to the components of the education system, and therefore in offering initial and continuing training to suitable people in terms of standards and on the "right" scale in terms of the economy, will a highly developed economy such as western Europe be able to carve out a major locational advantage for itself in global competition. In order to be able to cope with the above-mentioned changes and global competition, which is not just economic competition but also takes in culture and science, the VET systems must improve their institutional properties in such a manner that costs and benefits become more transparent and information can flow more rapidly into resource-allocating decisions. Only in this way will we be able to guarantee growth and employment, prosperity, economic and cultural growth in the long term.

Hence attention should focus on improving the institutional conditions and decision-making bases and on regularities and theoretical links which could be guidelines for VET decisions.

One main aspect will be that the costs and services of vocational school and universities will have to be improved by means of public reporting. This could mean reporting, in addition to the commercial accounting every year, about staff and materials, pupil teacher relations, number of drop outs, number of repeats, hours missed, pupil absenteeism, number of graduates, number of transfers to higher schools and universities, the placement of graduates in the employment system, international contacts with data on exchanges of pupils and teachers, practical links and organisational forms of their implementation, in particular expert and non-expert services (e.g. bridge, adaptation, special courses for the learning impaired, looking after foreign pupils, diagnostic and psychological services) etc.

Furthermore, this implies independent schools and universities which are rewarded for their services and means a certain degree of risk having to be borne for the decisions taken by them since they have to compete with each other for trainees.

The State must see its primary function in shaping regulatory and competitive conditions and learn to differentiate between VET funding and VET subsidising. The State takes on VET financing on behalf of the investor (pupils, students, trainees undergoing initial or continuing training) and should therefore treat VET as a budgetary item and render VET calculable by means of cost-benefit aspects. VET subsidies are targeted interventions in the competitive education system in order to charge specific services or undertake corrections which from the angle of the competent state bodies must bring with them the promise of a return.

There are several regularities concerning the costs and benefits of VET.

Age dependence of VET returns: On average the returns on educational investment are greater for young people than they are for older people because (1) they have a longer phase of return ahead of them and (2) by means of early acquired education they have met the preconditions for the acquisition of additional knowledge and skills.

Qualification dependency of VET returns: Generally it can be said that the income of the less qualified (unskilled) workers has fallen increasingly behind that of the more qualified in the last few years (formation of a gap). Nevertheless it can be said that the price and hence the return for qualified work is subject to the relationship between supply and demand and that consequently the return depends on its scarcity on the labour market irrespective of the volume of the educational investment.

Monetary net returns are normally positive in ex-post calculations: Monetary income, which is attributed to educational investment, is normally higher in most return calculations than the costs attributed to it. This also applies in part to attempts to take into account talents, family and other social environment, work experience etc. However, income increases and net returns do not provide any information about the increase in productivity: One of the reasons is that the price effects cannot always be excluded and that with the given market power the link between productivity increasing VET investment and the returns on it becomes invisible.

Returns on VET investment generally show the expected course over the levels of the education system: They are the highest on the lower levels (primary sector) and decrease and in some cases are negative as people proceed through the other levels (secondary, tertiary sector) of the education system. Given the ban on child labour there are no alternative costs in the primary sector which means that with the same educational income the returns are far higher given their far lower costs.

For the individual the return on educational investment is higher in EU Member States than the return on state or public subsidised programmes: The reasons for this are the high subsidies which the states and municipalities give to the individual. This applies in particular to the tertiary education sector (polytechnics, universities), where the costs and state subsidies per study place including other allowances (acceptance of longer training times in respect of state or statutory pension, sickness and accident insurance, reductions when using public transport and other public institutions) are higher than in the primary and secondary sectors. If we assume that the imponderable effects are relatively low, this generally implies an over-investment of the state in university education.

Gender dependence of education returns: In the case of the income of less qualified women, the qualification dependency is greater than in the case of men. For them qualification is particularly rewarding or leads in the case of less well qualified women to a larger income loss. In most cases the returns for women are lower than for men. This can partly be attributed to the fact that a large proportion of women have part-time employment or have withdrawn from paid work because of maternity leave, bringing up their children, and looking after older family members. At the same time the growth in return for women is greater than for men as they increasingly invest in education (educational level).

Break up between individual rationality and overall economic efficiency: For the individual it is often better to select a strategy in order to obtain a better job by means of a formal training certificate in respect of competition even when this job could have been taken on without the formal qualification (inappropriate employment). In terms of the economy this is ineffective and a waste of resources, but it may be a rational behaviour in terms of the individual. To avoid an erroneous steering of this kind an improvement of the information basis is required both in respect of the decisions of the individual when it comes to investing in VET as well as in respect of the decisions of companies and state bodies financing training investment. A decentralised, competitive education system, whose performance units have the necessary power to take decisions in order to produce or to procure the necessary information when it comes to unclear expectations and implement these into decisions which shape the corresponding education processes, is an important precondition. Furthermore, the fiscal parity of training investment is necessary with fixed asset investment in order to avoid as far as possible imbalances in the development of both.

Returns on VET investment in the EU Member States are seemingly lower than those in general education. However, these statements must be interpreted with extreme caution. The complementarity of the two make an exact allocation of returns to general and vocational investment very difficult. At present in European countries the trend is an over-emphasis on the contents of vocational education in schools which could be acquired in a more cost-efficient and profitable manner in vocational practice and at the workplace. The reasons for this are the state subsidies for school education which reduce the costs of initial and continuing training both for the individual and for his later employer. The efficient and ongoing balancing of general and vocational education investment will only then be possible when more particularly the allocation of costs is done in a more correct manner and formal general school education and in-school vocational education will be restricted to what can be taught at the most cost favourable level. This implies that the power of teachers associations and their dovetailing with state administrations and politicians, as can be observed in a number of EU Member States, must be restricted.

In-school vocational education should restrict itself to those subjects which are not specific to the companies and which can be acquired more cost-effectively at school than at work. In the narrower sense the dual system offers vocational education good preconditions for ongoing trial and error and necessary adaptations for the distribution of tasks between schools and companies as long as this is not over-regulated by the state.

Age dependence of return effects of state VET subsidies and qualification programmes: State subsidies (allowances, subventions) for education and training measures for older adults with large education and learning deficits and for qualifications for older, unemployed workers are not so efficient as they are for young people. Furthermore, it has been shown that above a specific age and below a specific qualification level education investment and state subsidies for qualification programmes produce very low returns. A redirection of state promotion of vocational education which bears this in mind leads to higher returns with the same level of costs.

Monetary returns on private qualification programmes tend to be higher than those of public ones. Private qualification programmes have the advantage that (1) employees are promoted who profit most from this (improving monetary returns) and (2) they orient themselves more to the market, i.e. to qualification demand. Public qualification programmes in contrast yield far less an increase in monetary returns and this increase is far below the increase in the return of private qualification programmes. However there may be greater imponderable effects. It is therefore recommended that more tax relief and subsidies should be granted for initial and continuing training on the job than for large public initial and continuing training programmes. The latter should be re-examined, replaced by private, state subsidised or other schemes or even dismantled.

For older, less qualified workers wage subsidies are more suited to raising their work returns (monetary income) than are investments in initial, continuing training and retraining. Wage subsidies not only promote the employment of older workers, but also lead to the (functional) learning of skills at the workplace. Wage subsidies do tend to reduce investment in vocational training. But along the lines that the qualification of the less able, older workers is unproductive, the individual and economic advantage is greater. Furthermore unemployment with its destructive effects on the individual is prevented and socially imponderable returns are obtained such as a reduction in criminality or a strengthening of social stability.

The financial means and measures to overcome particularly large educational deficits have declined in recent years. Unskilled or semi-skilled workers are receiving less additional support for on the job training.

Group-specific willingness to run up debts is not clear. Advocates of the zero rate and state subsidies frequently argue that loans prevent young people from less well-off families from going to university. This situation is not clear. It is true that the number of students in these groups is far lower. But the reasons for this are normally not a lack of financial means. The family and its environment often do not meet the preconditions which would make investment in university education worthwhile both in terms of the individual and the economy. An unfavourable family and social environment cannot be compensated so readily by zero rate, grants, state guarantees, interest subsidies or the like.

Additional funds for public schools under the existing circumstances will probably only lead to minor increases in quality. As a rule, public primary and secondary schools are normally subsidised by the state to 100%. It is likely that additional public funds in most EU Member States only lead to minor improvements in the standards of public schools under the given administrative conditions. There are more recent findings which indicate that measures to support the viability of families early on involving the same level of costs generate greater returns for the individual and the economy in a direct manner as well as through the ability acquired early on to make further education investment as a way of increasing return as a means of keeping pace with future structural or technical change.

As a rule continuing training does not lead to higher wages and salaries. In the Netherlands, the figures indicate that in-company continuing training has already proved its worth with a wage increase on average of 2.8% for each successfully concluded continuing training course.

Educational investment and the risk of unemployment: The employment risks of the graduates at the different educational levels and strands are different and vary in terms of time and place. On the whole the labour market risk for graduates from lower educational levels is greater than that of graduates from higher education levels. Furthermore, the risk of unemployment varies considerably amongst the higher educational certificates. The risk of unemployment in recent years has probably widened considerably between the lowest and highest qualifications. A development of this kind is dependent above all on the institutional factors of the labour market which amongst other things prevent necessary flexibility in wages and on the circumstance that companies assume a high probability of in-company application when a higher formal certificate has been obtained. They assume that the free selection processes of public schools and universities could not be matched by them without resorting to costly selection processes.

The influences of state taxes on the costs and returns of VET investment: From the economic angle it is desirable for the scarce resources of an economy to be used as effectively as possible for the development of human resources and real capital. This calls for a tax and levy system that avoids distortions in the formation of human and material resources by means of equal treatment. If an economy moves from a progressive tax rate to a less progressive one, then it is to be expected that in overall economic terms the stock of human resources will increase since the net return after tax, i.e. available income, will increase for broad echelons of the population. At the same time, there is probably a negative effect on the VET investment of the less qualified who are less well off following a change of this kind in the tax rate. If the tax system shifts in its weighting from taxation of income to greater taxation of consumption, then investment in human resources will be increased. However this will lead to greater income inequality between skilled and less skilled workers since further investment in vocational training for the latter will be less rewarding. If training costs, study fees etc. are tax deductible items, then this encourages investment in human resources.

As a rule tax systems give more advantages to people from wealthier families and more qualified workers than they do to the less qualified. The latter group benefits from state expenditure policy by means of the social transfer.

Compared with the incentives which tax policy has on investment in real capital, the effects of taxes on investment in vocational education are limited. This is probably mainly due to the fact that education so far has been regarded as a State responsibility and the State, along with the municipalities, runs the schools as part of the administration and finances them from state or municipal budgetary funds. If, however, the subsidiary function, which the state assumes for the above reasons in financing and which can best be assumed by means of a public educational bank, is separated, then the task of the state within the framework of fiscal policy is restricted to the tax handling of educational investment or the granting of subsidies for specific services which are not spontaneously offered by decentralised education systems and to the distributive measures within the framework of the goal of social justice.

1. COSTS AND BENEFITS AS THE CRITERION

In economic terms vocational education and training (VET) is an investment in human resources. Vocational training programmes, efforts by individuals to acquire knowledge and skills, in some cases also values, serve the purpose of making human work performance more productive than it would be without them. Hence vocational training (in the widest sense) is a "production detour" which generates costs but which must pay off later by means of higher returns.

Contrary to the situation in general education in which consumption elements play a role, vocational training is constantly orientated towards improving the return on human work in comparison to the previous situation[1]. It is not therefore an economic presumption to submit each and every type of vocational training to a cost-benefit analysis and to examine whether the return on vocational training (tangible and intangible income) or its benefits in the widest sense are greater than the costs. This applies to the individual (employee, self-employed) who at least for a short period takes upon himself the efforts of acquiring knowledge and skills and renounces other activities during that time; and to the company or plant (employer) who provides the training place or provides continuing training programmes for his employees. For companies[2] the costs of the initial and continuing training programmes must "pay". This means that the returns on initial and continuing training programmes must be higher than their costs. In the final instance the same applies to the State bodies or the public authorities, their initial and continuing training schemes and programmes as well to the costs borne by them in the form of subventions (subsidies, interest subsidies, guarantees) and tax relief.

All these schemes and financial support must be measured against the yardstick that human resources are rendered more productive in the overall economic sense and reach a level in social terms which would not have been possible without the State schemes and aids[3]. Even private foundations and donors, who fully renounce any return (counter-service by the recipient) will assess this selfless support according to whether the promotion of vocational education has reached the goal of enabling as many people as possible, by means of financial and other forms of support, to acquire vocational training which enables them to become economically independent or which at least gives them as much access as possible to a high return on their individual skills.

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[1] This does not exclude that vocational training as a "side product" may also have some consumption elements i.e. the acquisition of vocational training contents already brings with it a benefit, is a pleasure in itself. This does not exclude that vocational training as formal education is not oriented towards increasing performance but far more to obtaining economic returns by means of access to a closed labour market. This means that major parts of general education are "vocational training" in the economic sense used here and therefore have an investment character.

[2] The term "company" is used hereinafter to describe all companies, plants, freelance offices and offices independently of whether they are profit or non profit organisations seeking merely to cover their costs. This is not important for the ensuing statements unless this is specifically indicated.

If investment in vocational training meets the criterion of benefits > costs, then this will result in an increase in prosperity for the individual and under specific conditions for the economy as a whole. Investments of this kind increase the gross national product, promote economic growth and increase a country's tax revenues. If they fail to meet this criterion, individual and national resources are exhausted but there will be no net return.

2. THE IMPORTANCE OF THE INSTITUTIONAL FRAMEWORK FOR THE RECORDING OF COSTS AND BENEFITS

Since decisions by the individual, the company, the State or non-profit foundations to invest in vocational training are always taken in a situation of uncertainty, false decisions and mis-investments can never be ruled out. Concerning the individual and the national economy, decisions should be taken as efficiently as possible and erroneous decisions should be avoided. Suitable institutional conditions are an important precondition for this.

Already at this point it becomes clear that the various references (e.g. European Commission DG XXII 1996, pp. 13-43; Tessaring 1997, pp. 21-39) to the positive return on training investments and the calculations of training return - if the data have been correctly recorded and calculated - might prove to be true for the corresponding period under review as well as possibly for the operators concerned. However, these historical data cannot be the reason for assuming that it always pays to invest in vocational and academic training. This applies both from the angle of the individual, the company and above all from the angle of the State since it bears by far the largest share of costs for schools and universities funded from income from tax payers and is at the same time responsible for the institutional preconditions in which decisions of investment in human capital are taken. This does not say anything about the educational or other alternatives, the choice of which would have been more favourable in the respective situation - not to mention the advantages of different training routes and certificates or the benefits of different education, training and qualification services.

False decisions concerning investments in vocational training and the risk of erroneous macro-economic developments in the creation of human capital depend, natural resources (people's aptitudes, talents) and requirements of the employment system given, to a large degree on the institutional conditions under which decisions are taken. According to the statements of the economics of institutions, erroneous decisions can be avoided

(1) the more the individual (investor) has an incentive to inform himself about his personal suitability for a vocational training programme and about the later opportunities to use the knowledge and skills acquired, if he is free to take training decisions according to his expectations; but he also has to bear the cost of these decisions in the same way as - being the owner of knowledge and skills - to obtain the returns;

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[3] It is common knowledge that the state - depending on cultural tradition and constitution - has to facilitate by means of suitable framework conditions and other methods the highest possible return on investment in the performance of economic subjects besides its allocational targets and also to assume social distributive tasks for instance by means of transfer payments. Measures of this kind are to be distinguished from measures to increase the performance of the individual or the economy as a whole. They are not oriented towards generating net income (costs < return) but towards the agreed distribution of what has been generated or more just distribution of income, assets and opportunities in order to ensure that in the long term efficiency can also be promoted indirectly.

(2) when the companies and the State as the providers of initial and continuing training or as the pre-financiers or subsidisers of vocational training investment, are interested in producing information about the costs and benefits of vocational training and in generating net returns. For the companies these conditions are best met when they are profit-oriented and when they are constantly controlled in respect of their performance by competition on the goods and factor markets. This applies to the State and other public bodies as the providers of funds only to a limited degree (competition between State or municipal individual budgets, competition in terms of attractiveness and location between territorial entities, control by the electorate) and this also applies less to state and public schools which are normally dependent institutions in economic and pedagogical terms without any cost and performance calculations and above all without any external control and sanctioning mechanisms. Similar things apply to non-profit private organisations when a foundation or subsidy market is only beginning to develop and when there is no performance transparency or reporting obligation.

Investments in vocational training will tend to go wrong the less the people involved in the decisions are informed about the costs and returns (information deficiency) and the more institutional conditions allow those involved to pass on the costs to other members in society but, at the same time, to appropriate the monetary and other benefits or when others are in a position to reap the benefits without bearing the costs.

This situation is going to be demonstrated by taking some examples from Member States of the European Union:

In the German dual system of vocational training, for instance, it can be observed that in a number of normally demanding training occupations (e.g. industrial mechanics, construction mechanic, bank clerk, cf. Table 1), companies bear the costs of the training places but are normally not in a position to access the return on training on a scale which would at least enable them to cover the costs incurred. This situation is attributable less to the fact that companies take wrong decisions within the framework of their medium and long term personnel planning or erroneously assess the actual suitability of the individuals undergoing initial or continuing training (wrong entrepreneurial decisions). This has rather to do with the fact that the institutional conditions make it more difficult to make profitable investments in the training of their own junior staff or in the further training of their staff. The consequence is that in a competitive situation, training places of this kind (perhaps also continuing training measures) are not offered on a necessary scale or that the training company may reduce the costs of training which can have unfavourable effects on the quality of training. Conversely, in the German dual system there are training occupations in which company returns are clearly and systematically higher than the costs of the training already during the training period. In these cases, too many training places are offered and accepted by apprentices because of a lack of transparency on the training market or because of a lack of training alternatives. R. Neubäumer (1997) again clearly identified this only recently in an empirical study for the Federal Republic of Germany.

Table 1:

In-company training costs in Germany 1991, in DM

	Bank clerk	Construction mechanic	Industrial mechanic
Gross costs	32,768	33,360	39,273
Return	10,258	7,789	10,841
Net costs	22,510	25,571	28,432

Source: Federal Institute for Vocational Training

School training systems such as the French one scarcely provide any information about costs and benefits and make cost-benefit considerations even more difficult for those concerned (trainees and companies) on the transition threshold from school training to employment.

The more market-oriented training system in the United Kingdom practised since a number of years as well as the in-company continuing training systems in general in various countries, have established a closer link between the costs and benefits of vocational training and tend towards a more correct consideration of them in initial and continuing training decisions. In the school (secondary level) but above all at university level the institutional and financial conditions tend to indicate over-investment. The costs of schools and universities borne by tax payers correspondingly reduce the individual costs of training whereas the apprentices for instance in Germany themselves bear the costs indirectly by means of productive work during training and later often because of their lower wages. Correspondingly the individual demand for school and university education is higher.

For a specific segment of pupils the obligation to attend compulsory education may mean higher individual costs (foregone paid activities, dissatisfaction at school, shortage of functional participation) and correspondingly lower income throughout working life and individual prosperity, in part also social costs above all through vandalism and criminality in and outside school (Husen 1978, Eichhorn 1979, Rubel (ed.) 1965, Cameron and Heckman 1997, cf. also van Lith 1985, pp. 73-79 and the Crowther Committee in Great Britain).

In the opinion of some economists, privately financed initial/continuing training and retraining schemes for job seekers are superior to State or publicly (municipally) funded schemes because amongst other things the costs and returns on schemes of this kind are more balanced and take into account market signals (Lillard and Tan 1986, Bartel 1992, Bishop 1994, Heckman, Smith and Tabor 1996, Wolfing and Brinkmann 1996, Bach and Spitznagel 1994). It should be borne in mind, however, that the target groups in respect of their qualification preconditions are not always comparable and furthermore public institutions such as the Federal Employment Services in Germany have to run programmes which are not offered and could not be afforded by the private sector (cf. also Blaschke et al. 1992 and 1995).

To the extent that the institutional conditions largely guarantee the correct assignment of costs and benefits, wrong decisions are less likely and if they are taken they will be relatively rapidly corrected in the institution's own interest. Erroneous estimates of the costs and benefits of vocational training by the individual participants in initial and continuing training, by companies and State or public bodies will never be completely avoidable. Decisions about investments in education are genuine "entrepreneurial" decisions taken in a climate of uncertainty.

3. COSTS AND BENEFITS OF VOCATIONAL TRAINING AND THE LIMITS OF COST-BENEFIT ANALYSES UNDER EXISTING INSTITUTIONAL CONDITIONS

Since investments in vocational training have increased considerably (cf. for Germany: table 2) and should always aim at generating net earnings, at promoting productivity, monetary and/or non-monetary income of individuals and the whole economy, as well as at promoting growth, employment and the dissemination of innovations, there are numerous efforts to prove this on the micro-economic (cf. also the references given by W. Kau, in this volume) and on the sectoral and macro-economic levels (cf. the synopses by the European Commission, DG XXII 1996a and Tessaring 1997) or to subject it to critical examination (cf list of references by subjects).

Table 2:

Costs per pupil in vocational part-time schools, Germany 1990 in DM

Total personnel expenditure	7,903
Total material expenditure	1,133
Total operating expenditure	9,733

The objective (scientific) recording and calculation of the costs and benefits of vocational training still face considerable difficulties even today. Despite the methodological progress of related approaches this applies to the individual economic viewpoint (trainees undergoing initial or continuing training, company, school) and all the more to the macro-economic and State level (Griliches 1997, Welch 1986, Dürr 1996). Considerable progress has been made in regression and factor analyses and in distinguishing between parameters such as natural talent, origin and social environment, practical work experience, educational results, productivity, educational return and career opportunities. Nevertheless the results are frequently not convincing for various reasons. Above all the decision-making foundations are scarcely of any use for the individual and for companies and State authorities for the following reasons.

All the econometric and financial mathematical calculations (cf. list of references by subjects, sections: growth, employment, productivity, income, educational return) are ex-post calculations. Ex-post observations, however, are not a suitable basis for decisions about investing in education and certainly not about investing in specific education, educational routes and qualifications. They can scarcely contribute anything to the central issues of the allocation of scarce resources and the efficient development of human resources - if at all, only in the form of monitoring success. What constitutes a viable investment in vocational training at a specific time and at a specific place under specific conditions must not necessarily be a viable investment under other conditions. This applies to the individual, the investor, and also to the company financing vocational training and the State.

A projection, such as that undertaken in the form of cost-benefit analyses in respect of infrastructure investments by public authorities in the transport sector (in the motorways, road tunnels, railways, airports) or as undertaken by private investors within the framework of investment planning, has not been done so far. The methods and the data required for the prospective estimation of increases in growth, productivity, employment, wages and income in some cases are either not available or are not reliable enough.

Micro-economic and aggregated macro-economic costs and benefits are subjective and furthermore are limited parameters concerning time and space whose knowledge exceeds the potentialities of science.

What is noticeable in this connection is that science are called upon and commissioned to calculate education returns and the other positive effects and to calculate the returns and yield on investments in education. This is not, however, a task for science as an institution which is interested in new, space and time-free knowledge - that is the identification of regularities. Investment planning and control is an entrepreneurial function which is a daily task and responsibility of each investor but not of science[4].

If this is correct, there is no need for more detailed focusing on the various methods of regression analysis and investment calculation. Attention should focus far more on how the preconditions can be met for an improved estimation of costs and benefits by those concerned in respect of the diversity of vocational training alternatives and the expected developments on the labour markets. In this context it should be stressed that costs and benefits are subjective concepts.

4. THE SUBJECTIVITY OF COSTS AND BENEFITS

In economic terms the correct cost term is *subjective* costs, i.e. costs which the decision-maker (trainee in initial or continuing training, the company offering continuing training, the school or the State body financing training) expects when he or she gives preference to one alternative (initial, continuing training) over another. This is the case for a young person for instance who decides to undergo initial training rather than to earn his money as an unskilled worker. In the same way the company offering initial or continuing training bears the costs of the alternative to recruit trained staff instead of investing in initial vocational or continuing training. Public bodies have to bear costs because they have to renounce the alternative use of taxes and levies and thus public and social advantages which would otherwise have been generated. This applies to the State financing of schools as well as to the subsidies and other assistance for trainees in initial and continuing training or for companies.

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[4] Of course, a distinction must be made between that and the processing and examination of the reliability of investment calculations, cost benefit analyses, econometric procedures etc.

Any attempt to identify the costs and benefits of vocational training in an objective manner is subject to limits because recording and identification face the difficult problem of revealing the subjective costs perceived by the decision-maker after selecting the best alternative. To the extent that the trainees undergoing initial and continuing training and companies are able to express their preferences for specific training programmes within functioning markets, the prices which are formed on these markets are relatively reliable indicators of the costs (or foregone alternatives). This also includes for instance monetary income including statutory, collective bargaining and in-company social benefits. Aside from the fact that markets often have functional weaknesses (market imperfections, positive or negative external effects) which often have to be accepted because no better procedure is available, markets are not always available to reveal preferences and a willingness to bear costs. But even those costs and benefits which are difficult to measure but which nevertheless should not be neglected (such as the spatial proximity to employer, the social integration into family circle and circle of friends, leisure and sport activities, social prestige in the case of training in a particularly well-known and reputed company) are assessed in a subjective manner by trainees and are therefore included as determining factors in the decision about initial and continuing training.

From the company angle greater social prestige is assigned to companies which offer a good training and focus in a comprehensive and generous manner on the continuing training of their workforce. Furthermore, the positive and not easily quantifiable effects such as cost reductions in induction and personnel procurement (cf. von Bardeleben 1995, G. Cramer and K. Müller 1994, R. Weiss 1990) are included in the cost-benefit considerations of companies. The same applies to municipalities and other public authorities and to State bodies who finance initial and continuing training where social goals are particularly to the fore, the implementation of which is a State task and can be achieved in the most cost-efficient way by promoting investment in vocational training rather than in other measures.

Finally it is not or only indirectly a question of the social advantages of vocational training which can be expressed directly or indirectly in monetary units which neither the individual worker nor the individual employer includes in his subjective cost-benefit calculation. At the same time they are of considerable importance and are part of the overall economic cost-benefit calculations from the economic angle. This may include, for instance, the promotion of social and political stability, democratic awareness and tolerance, reduction of criminality and vandalism, promotion of health and rational consumer behaviour, changes in generation-related behaviour. If this is correct, it is the task of the State to correct the individual decisions of investors in education by means of subsidies or other suitable measures to the extent that the damage which can be avoided will be greater than the costs of the subsidies and schemes.

5. VOCATIONAL TRAINING, INCOME, EMPLOYMENT, ECONOMIC GROWTH AND INNOVATIONS

5.1 Education, training and economic performance

One of the central questions is whether and, if so, to what extent vocational training promotes economic growth. This question is all the more important since in the Member States of the European Union there has been considerable investment above all in academic vocational training. This policy was generally based on the idea that investment in general and vocational training promotes the growth and economic development of a country. The more investments in education are taken, the more economic growth is resulting. This however is a mistaken estimate of what education, in particular vocational education, can in fact achieve.

The previous comments reveal that vocational training always promotes economic growth, measured against the real GDP, if the individual undergoing initial or continuing training, or the company and the State funding vocational training, realize net returns, provided that this happens under institutional conditions which guarantee wherever possible the correct allocation of costs and benefits. A positive effect of investment in vocational training on economic growth is also to be found when the GDP is not growing but through vocational training, through the performance and flexibility of the initial and continuing training system its decline is halted. This will be the case particularly in periods of major structural change. Macro-economic ex-post estimates of the influence of vocational training on economic growth are extremely difficult in assessing this correctly. What is far more important than an accurate ex-post estimate is that those involved in the decision-making system obtain correct information in time concerning the expected costs and returns, that they take their decisions along those lines, monitor them and correct them if necessary. This, however, requires major capabilities in information-processing and flexibility of the education system and the labour market.

Empirical studies may be used which draw on education figures[5] (participation rates by age groups within primary, secondary and university education or the literacy rate) as an auxiliary to assess investments in education (cf. particularly Alesina et al. 1992, Amable 1993, Barro 1991, Baumol et al. 1991, de Long and Summers 1991, Blomström et al. 1992, D. Cohen 1992, Denison 1998, Engen and Skinner 1992, Levine and Renelt 1992, Lichtenberg 1992, Wolff and Gittleman 1993)[6]. They aim at determining the influence of education on economic growth but are ex-post parameters and apply solely for the period and country for which they were used. They cannot, therefore, be used as examples in order to explain the same behaviour in other situations. Reference to them merely shows how little those involved know about the costs and benefits of vocational training and that on this basis decisions are taken about training investment and its financing. The individual investors, training providers and sponsors of vocational training will, however, have expectations about costs and benefits. In principle, this is the same procedure as for investment in materials although in the case of investment in vocational training it is difficult to estimate the returns over long periods.

Despite the problems and difficulties in calculating the contribution of vocational training to economic growth, it is not very surprising when the results are so different in terms of the individual and the whole economy. Examples can be given in which education clearly has positive macro-economic growth effects just as there are examples in which investment has not triggered any growth effect particularly in school and academic education, where unemployment increased amongst school graduates and academics and where the education system was sometimes used to "park" people out of work. In the macro-view, this is particularly the case when the duration of compulsory education has been increased, when there is no corresponding demand for trained labour in the economy and administration as was observed in some developing countries. For the Federal Republic of Germany and a few other countries in the European Union it can be noted that the high economic growth in the 1950s and 1960s was achieved by workers which had far less schooling and had received far less academic training than the workforce in the 1980s and 1990s (cf. the literature given in van Lith 1985, p. 28, 76).

At the same time, it can be noted that the considerable investment in education and training could not provide the stimulus for more macro-economic growth and employment and that instead the lower levels of the employment system were occupied with long-term and academically trained workers (Büchel 1995, Büchel and Weißhuhn 1996) whose training was not necessary for carrying out these jobs. Nevertheless the behaviour of the individual to invest in formal training was rational under the given conditions as long as they could expect that a formal qualification on higher secondary or university level would increase their competitiveness with others and as long as the costs of training were borne by the general body of tax payers. For some of them however this behaviour would probably not have been appropriate if they had to bear the cost of their longer in-school education themselves and if they had included this in their cost-benefit calculations. In other words, over-investment occurs, individual economic rationality given, in the case of State subsidies and if the costs can be passed on to other people.

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[5] Cf. OECD: Education at a glance OECD indicators, Paris 1995, pp. 125 ff.

[6] Cf. the overview in Tessaring 1997, p. 43 f. and European Commission DG XXII 1996, p. 2f. and 14 ff.

In this connection the recruitment behaviour of employers also plays a role: they assume that the "over-qualified person" should be given priority over someone who is sufficiently qualified and offered the same wage. This is based on the assumption that in a situation of uncertain expectations the opportunity to obtain the desired performance is greater in the case of the over-qualified person. Employers expect the benefit of a gratuitous selection of candidates within tax-financed schools as being greater than the net benefit of their own selection procedures which cost money. To that extent the behaviour of employers is rational, too, although under the given conditions this systematically leads to macro-economic misinvestments in vocational training.

Concluding, the fact that these are ex-post calculations and that the statements are furthermore lacking theoretical, universal reliability, means that they are an unsuitable basis for any decisions about future investments in vocational training. The statement "investment in training increases economic growth" does not apply in general nor does the general statement "the higher the participation in education, the higher the level of economic growth" or "the more expenditure on education, the more economic growth there is". Even the statement "the higher the illiteracy rate, the lower the level of economic growth" cannot always be confirmed for the above mentioned reasons either.

Equally, when monitoring State education and investment, i.e. when examining whether educational investment has promoted economic growth and when examining whether perhaps different approaches should be taken in future, the above-mentioned calculations may, among other things, only be interpreted and used with considerable caution for the reasons given below:

- As measurement concepts they are neither accurate or differentiated enough in order to be able to distinguish between alternative educational investments and education routes sufficient to accurately determining their contribution to economic growth. In addition, they cannot state about whether the scale of school education was necessary on that level or whether some parts of this education or training could not perhaps have been offered in a more flexible and cost favourable way at the workplace or otherwise functionally incorporated into the social environment.
- They do not take into account the complementarity of human and material capital and the problems of the allocation of the production results to the factor labour and the factor capital in conjunction with changing technologies or changing production methods. Thus, the return and equally the productivity of an hour of qualified labour will increase when as a consequence of technical innovation the machine contributes a greater performance to the overall result or when as a consequence of organisational changes the return or the value product are positively influenced without a change in the work performance.

5.2 Complementarity of vocational training investments and fixed asset investments

Theoretically, investments in vocational training can be independent of investments in fixed assets, they may substitute or supplement them. In fact, however, only the general, elementary educational goods (internalisation of values, acquirement of fundamental social skills such as speaking, reading, writing, arithmetic) are independent of the quality and quantity of fixed asset investment.

There may be a twofold substitutive relation: substitution of real capital by investments in vocational training and substitution of human capital by real capital. In the first case the qualification of skilled labour and its use leads to the substitution of previous production plants and methods. This is of minor importance. In the second case new plants and production methods replace labour. In the micro-economic and much more the macro-economic view the complete replacement of skilled labour by capital is not possible. The complementary relationship between real capital and human capital is, therefore, to the fore of our considerations.

Investments in vocational training normally go parallel to investments in real capital. They will change in their volume and quality depending on real capital although if they promote the dissemination of new scientific and technical findings, and thus make possible innovation and technical progress. In the final instance every stimulus for qualitative changes of real capital stems from qualified and highly qualified work performance. Per se, and without a link to real capital and work organisation, investments in vocational training yield low returns. This even applies to general, vocational training contents which have a low productivity if they are not supplemented with specific know how and skills. Vocational training investments will be the more productive the more vocational training and real investment are finely tuned to each other and the less neither the one nor the other creates a bottleneck which impairs the overall productivity of the utilised performance factors taking into account their cost prices. Investments in the qualification of the labour force in itself does not generate a return or promote growth unless the acquisition of know how and skills will lead to fixed asset investments and thus increase employment.

Very little is known so far about these interrelations. It is, however, likely that investments in vocational training only rarely induce fixed asset investment disregard university research and the diffusion function of scientific instruction (cf. list of references by subjects, section innovations). The reason is that fixed asset investment presuppose an entrepreneurial idea (a new product, cheaper production methods, market potential untapped, so far) - knowledge which is not normally the subject of vocational education. Entrepreneurial ideas are scarcely emerging by means of vocational training and rarely by continuing vocational training, but - if at all - through occupational practice and market experience and through personal traits and competencies which can scarcely be developed or taught in schools and universities. Accordingly, economic research cannot confirm any empirical link of this kind. This does not exclude that when there is an entrepreneurial idea it becomes necessary to acquire additional know how or to recruit the corresponding staff or to purchase consultancy back up. This situation is well known from cases in which computer scientists, engineers and natural scientists working in companies had to acquire commercial knowledge.

In the last few decades State promotion of vocational training has concentrated on in-school schemes both in the form of general full time schooling, sometimes with occupational elements, on full time academic training both quantitatively and by extending the duration of studies, and also on initial vocational training with its theoretical and its out-of or inter-company parts. This applies at least for the Federal Republic of Germany[8].

It is also assumed that the occupational qualifications acquired in this way are certainly not acting as stimulus for additional business activities or corresponding investment in real capital and new jobs. Far more it is assumed that the more school-oriented and theoretical knowledge produced fewer business ideas, new companies and investment[9].

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[8] Cf. Federal Ministry of Education, Science, Research and Technology: Basic and structural data 1996/1997. This has tended to lead to a decoupling of vocational education from the labour market which has had a positive influence on the return on education investment. In this context a large proportion of the costs was passed on to tax payers in the form of higher taxes. A brake on economic growth is therefore more likely.

[9] In Germany and other countries several initiatives have recently begun at the universities to work in the opposite direction.

For Germany but also for other countries in the European Union it can be observed that the trend towards schools and theoretical education has, at the same time, encouraged a development which has led to young people after completion of these educational paths to look for more stable jobs in public administrations and large private companies rather than in risk related, entrepreneurial or independent areas of activity. This development was only recognised recently and attempts are made by means of State programmes to counteract this trend[10].

When investment in vocational education is seen as a complement to fixed asset investment, it yields the highest return when qualifications are acquired which facilitate real capital investments in new business areas, new products and procedures and thus make vocational training efficient and profitable. If areas of this kind as well as market gaps, new markets and growth opportunities are missing, it cannot be expected that the education system and its sub-systems will promote growth and economic activity. Those expectations overstrain the education system and what vocational training can really achieve. If expectations of this kind are maintained, then they are caused mainly by the behaviour of the educational lobby and are possible because contrary to other sectors of the economy, schools and universities but also vocational training are not subject to competition and performance analysis in most Member States of the European Union as is the case for companies which are assessed by markets. One decisive point here is that those people who seek the services of school and academic institutions do not as a rule pay for them. It was not possible to develop price and cost transparency and related decisions by those involved. This lack of transparency and information has led to major erroneous developments and to a perseverance of structural distortions which are detrimental to economic development and competitiveness.[11]

A series of macro-economic calculations of return, educational investment result in positive contributions (Tessaring 1997, European Commission DG XXII 1996). We have, however, to bear in mind what these calculations really state:

- They often do not address the issue of whether education has made growth possible or whether, conversely, growth has led to an expansion of school and academic education. The latter would mean that we only seemingly have to do with investment in vocational education. In reality this expansion has a consumptive character and serves to uphold the rigidities on the labour and goods markets and to make possible the necessary adjustments by "parking" job-seekers outside the labour market. The label "investment" enables to procure the financial resources by imposing a burden on the general public. In some cases this behaviour is supported by the uncertainty which educational strategy is the appropriate one in respect of international competition and of comparisons with other countries. This consumption of resources is set against a minor return.
- Furthermore, a positive return does not indicate whether productivity has been improved and whether the positive return has not been induced by power positions on the labour market and therefore has its roots in monopolistic rents which have nothing to do with performance and productivity.
- Often they do not say anything about the extent to which the increased productivity of trainees is a result of their personal talents, family background, social environment or - in the case of those undergoing continuing training - of their occupational experiences in the employment system or of their actual performance at school, university or in the training company. In other words it could also be assumed that the same or higher returns and growth rates could have been achieved without any or at least less educational efforts measured in terms of the national income. Both from the angle of acquiring knowledge and skills (development of human resources) and from the angle of the education system having

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[10] For instance the initiative of SMEs "Go" of the Northrhine Westphalian regional government which expressly has these contents and explicitly corrects education and university policy.

[11] This also includes the efforts by industry in the Federal Republic of Germany to counteract the general trend towards young people spending a long time in schools and universities by means of specific material incentives and new career paths.

to select people mainly according to their talents and abilities (education system as selection system), the achievements of the education systems in some companies must be relativised particularly in the tertiary education sector. The free charge for users and the cost and price intransparency frequently observed seem to indicate that there are subjects taught and learnt in school and academic institutions which partly could be imparted in the employment system or at the work place at less expense. These are mainly subjects which yield no return because they are are superfluous and under conditions of greater cost transparency and cost allocation would no longer be taught in schools.

Finally it can be observed in the current economic debate about promoting overall economic growth and employment that the education system is not given priority. To a much higher extent obstacles on the goods and factor markets are held responsible for the weaknesses in investments and growth of the European economies: for instance over-regulated markets for goods and services; complicated approval procedures and environmental provisions, inflexible wages and rigid wage structures, high non-wage labour costs, low mobility of workers, high taxes and levies, and an aversion to technology amongst the population. By contrast, the obstacle to more employment and growth is not seen in the low performance of the general and vocational education system.[12]

5.3 Vocational education and innovation

In the overall context of vocational education, economic growth and employment the question is raised whether vocational training can promote innovation and technical-economic development. Here a distinction must be made between the question whether vocational training itself can trigger innovation and what vocational training can do in order to facilitate the application and dissemination of existing innovations. As a rule this calls for different or new qualifications. The latter would be a reaction of the vocational training system to the emerging qualification demands of industry and would determine the speed at which innovations in individual companies spread through certain sectors and through industry as a whole and thus could be used as competitive advantages. Whereas there is no doubt that the vocational training system makes a major contribution to pushing through innovations and their dissemination within companies and throughout industry thus documenting its importance for competitiveness, the reverse link is questionable.

Technical, labour-saving progress destroys what were economically viable qualifications. This applies to the lower qualification groups as well as to the medium and high levels such as engineers, chemists and other natural scientists (Bellmann et al. 1994, Prognos 1995, Staudt 1996). However, new jobs are created which as a rule call for new qualifications and trigger a new demand for qualified labour (structural change). This change tends to be linked more with process innovations rather than with product innovations. The prevailing opinion is that this leads to less demand for lower level qualifications and a growing demand for higher qualifications.

6. COSTS AND BENEFITS DEPENDING ON THE INFORMATION AND RESOURCE-CONTROLLING PROPERTIES OF THE EDUCATION SYSTEM

When the returns on investment in vocational education depend to a major degree on the requirements in respect of the various performance processes of industry and their changes by technical and organisational progress being recognised as early as possible and implemented in the form of educational decisions, and when today more than ever it is a matter of accurately estimating the talents and performance of individuals and of training them in as a cost-favourable a manner as possible in the tasks and functions in which they can make their best possible contribution for themselves and other members of society, then it becomes clear that today more than ever what is important are the properties of the vocational education system rather than the existing stock of qualified labour. It will mainly be a matter of creating the preconditions in order to reveal the true costs and benefits of vocational education in order to improve the decision-making bases of all those involved (owners of human capital, State and companies as the providers of subsidies and investment, schools, universities and companies as the providers of vocational training, State supervisory bodies etc.).

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[12] It is indeed the case that employers in the Federal Republic of Germany complain about the dwindling standards of what people learn at school. Even if this were true and an improvement in performance could be achieved, this might lead to new opportunities for individuals but in terms of the overall economy it is scarcely likely to have a positive effect in employment and growth.

The increase in the relative importance of the institutional properties of the vocational education system compared with the stock of qualifications (human capital stock) can be attributed above all to the following situations:

- globally available scientific and technical knowledge can only be used and applied in products and production methods if this knowledge is coupled with the factor labour which is in a position to understand this knowledge, to process it, further develop it or use it practically;
- the life cycle of products and services as well as production methods has been considerably shortened; further reductions are to be expected;
- research and development, innovations, quality assurance, services tailored to the individual customer will increase against the global backdrop;
- any standard which has been achieved in terms of qualified and highly qualified human assets risks far more rapidly than was the case before of becoming economically obsolete.

If that is the case then for the European industry what is important today is less the stock of intangible capital (stock of knowledge) and human capital than far more the ability of the education and scientific system to constantly produce, impart and apply new knowledge and, what is more, to identify the qualification requirements of an economy which is subject to permanent and accelerated change, to implement this in education, initial and continuing training products, and to select suitable pupils, students, trainees in initial and continuing training on the basis of their aptitudes, skills, talents and know how and to train them by drawing on suitable selected staff (teachers, trainers, etc.) and using the necessary and appropriate means and procedures.

Only when we succeed in more rapidly processing new theoretical and application-related knowledge using the properties of the education system, in training suitable people in qualitative terms and on the "right" scale in terms of the national economy, will a highly developed economy such as those in western Europe be able to develop a sustainable locational advantage in global competition. In order to tackle the above-mentioned changes in global competition, which does not just mean economic competition but also takes in culture and the sciences, the institutional properties of educational systems must be improved, the costs and benefits must be rendered more transparent and information must flow more rapidly into resource-controlling decisions. This is the only way of guaranteeing long-term growth and employment, prosperity, economic and cultural development.

A number of social scientists and economists (Memorandum 1995, van Lith 1983, Mertens 1995) are for the above reasons calling for a change in the paradigms of educational policy, which will lead to changes in the attitudes and behaviour of those concerned, i.e. teachers, school directors, State supervisory officials and training companies and also participants in initial and continuing training and which will reveal to a greater degree the costs and benefits of training production.

7. SCHOOLS AND THE COST AND PERFORMANCE TRANSPARENCY IN ORDER TO IMPROVE THE DEVELOPMENT OF HUMAN RESOURCES

The individual school and school organisation is to be measured in terms of its performance. This performance, unlike commercial companies operating on the market, does not involve the generating of a return on the capital invested but rather, as non-profit organisations, using the necessary funds is to provide the best possible initial and continuing training schemes.

The services are to be rendered transparent by means of corresponding reporting which does include commercial accounting but which above all makes it possible for trainees, their parents, employers, State bodies, expert organisations and media to develop their own opinion, to assess the performance of the school and evaluate it. The annual report, which may include compulsory and optional sections, may also cover the staff and material resources, the pupil-teacher relations, the number of school drop outs, students who repeat a year, teacher and pupil absenteeism, numbers of pupils successfully completing the course, transition quota to higher schools and universities, the successful placement of trainees in the employment system, international contacts with data on pupil and teacher exchange, practical links and organisational forms of their implementation, in particular technical and non-technical services (e.g. bridging, adaptation courses, special courses for the learning impaired, looking after foreign pupils, diagnostic and psychological services).

What is important in reporting is that the performance of the individual schools is subject to greater transparency and evaluation, that considerably more information is provided about "good" teachers, suitable school directors, goals, contents and methods of instruction, that schools compete with each other in respect of their services in order to prepare young people as best as possible for working life and the requirements of practice.

The incentive to create and use this information implies that information is worthwhile and that initial and continuing training services will be rewarded. If that is the case then what are to be expected are a far higher level of information, the mobilisation of performance reserves, a lower labour market risk and, consequently, safer returns on education investment linked with increased cost awareness and greater cost transparency. Under these conditions markets will emerge for teachers and school directors and indirectly teacher training at universities, and previous practical experience of teachers etc. will be subject to an assessment by schools and school sponsors. Of course there may also be flexible systems which are oriented more to practical requirements in which there are ongoing processes searching for new or changed qualification requirements, suitable methods and organisational forms of implementation, suitable and well trained teachers and pupils. However, it cannot itself create the preconditions for an increase in economic growth and employment. It can, however, by means of its greater adaptability and performance provide a stimulus for growth from a qualification side and guarantee a time-related and also qualitative edge over other education systems. This is an advantage which can sustainably increase the attractiveness of the location for domestic and foreign capital and its attractiveness for science and culture. Various studies commissioned by the governments of EU Member States (Germany: Federal Ministry for Economic Affairs, France, Great Britain, European Commission DG XXII) focus on these issues. The decisive and necessary steps are and must be expected in the next decade. This applies all the more the higher the proportion of in-school education in vocational education is and therefore will probably be particularly important for school organised vocational training in France.

8. FRAMEWORK CONDITIONS AND THE COSTS AND RETURNS OF COMPANIES

The goal of increased transparency for the estimation and allocation of costs and returns for the institutional arrangements also has consequences for the in-company part of vocational training. For the in-company part of vocational education, the decisive factor is likely to strengthen the control function of investment in vocational education (quantitative and qualitative demand for qualifications).

8.1 Design of in-company vocational training

Companies are themselves interested in good initial and continuing training to the extent that their training places and their continuing training programmes are actually oriented towards their own future qualification requirements. Unlike most State schools, those training institutions have an indirect interest in return derived from the company goals. Against this backdrop companies also have the incentive of shaping training contents and back up training measures in such a way that the bond to the company is maintained beyond the training period, for instance career opportunities, in-company pension schemes, profit sharing etc. From the angle of the companies this makes sense in order to secure returns from the trainees in the long term. At the same time it secures future employment for the participants in initial and continuing training.

This behaviour of the company is however disadvantageous for the trainee when the switch to a better paid or otherwise advantageous position is made more difficult and he cannot fully realise the return which he could otherwise have with his knowledge and skills acquired elsewhere. In macro-economic terms this would be undesirable, too, since the trainee achieves a higher productivity, a better position or can provide services on the same level of productivity which lead to added values and demand. State legislation and training ordinances serve the purpose of restricting developments and situations of that kind. However, it is in the interests of both sides that company-specific components play a role. That is for instance the case when they contain innovative components which have not yet become the common property of initial or continuing training and which only spread later, for example in conjunction with new techniques and organisational forms within or beyond specific branches.

Furthermore, it is economically correct when the bond to the company leads to the costs of the in-company training (including pre-financing costs) being covered by returns and the zone of net returns will start at the time of completion of training and the transition to an employment contract.

In principle, there are no serious problems in this case (interest of the company in the long-term covering of its own qualification needs). In their own interests companies consider the disadvantages and advantages of initial and continuing training schemes compared with alternatives such as recruiting skilled labour on the external labour market (including the risk of a shortage of skilled labour when others behave in the same way), substitution of work by capital, relocation of production to a different location. At least in Germany companies compete with their training services and candidates at the examining boards of the chambers concerning whether and with what results their trainees will pass the final exams. Furthermore, training contents within the statutory framework are the subject of discussions within the vocational training committees.

8.2 Influence of State training regulation on costs and benefits

The situation may be different in the case of the regulation of training occupations. Voices can be heard from amongst practitioners (chambers of industry and commerce, Federal Ministry of Education and Science) and scientific circles (cf. inter alia: Staudt) which state that the statutory regulation of training and training ordinances considerably delays the adaptation of training contents and the creation of new contents, and thus impairs employment and growth opportunities particularly in those areas which have a very promising future because of innovation and structural change. In these cases employment and growth opportunities are handed over to other business locations with a greater capacity for adaptation in their qualifications (cf. N. Oulton, in: Booth and Snower 1996). Regulations of this kind increase costs and reduce return if they impede the occupational mobility of pupils as a consequence of long retraining periods and costly retraining measures more than they bring about productivity increases and a greater degree of quality reliability in the performance process.

If companies do not orient their initial and continuing training capacity towards their own future qualification requirements, they clearly expect these requirements to be provided in a more cost efficient manner for them on the external labour market. This includes above all the institutionally important case in which the companies assume that the costs of training on average will not be covered by the returns generated by trainees (case of training below needs). Another possibility would be that training already generates larger net returns during the training period which would make trainees for companies for whatever reasons more profitable than other skilled workers (case of training beyond needs).[13] Typical cases of training below needs in Germany are (Neubäumer 1997) above all health care occupations, building engineers, surveyors, retail packaging experts, animal attendants, data processing clerks, road transport occupations, skilled chemical workers, gas welders, clerks in accountancy and fiscal occupations. Typical cases of training beyond needs are farmers, bakers, mechanics, butchers, hairdressers, painters and varnishers.

The first case may lead to bottlenecks and cyclical shortages or surpluses emerging on the market (K. Burdett and E. Smith, in: Booth and Snower 1996). In order to protect themselves against the risk of not being able to procure skilled labour in time, companies will select the path of their own training anchored in the company or run the risk and endeavour to attract skilled workers on the labour market by offering them higher wages and other bonuses.

8.3 Financing of vocational training

In both above mentioned cases in which the costs and return on training systematically deviate from each other on a large scale, German trade unions plead for a redistribution of financing (cf. IG Metall 1983, German trade union convention (DGB) 1995, Senator Brüggemann 1996, all quoted by van Lith 1997).

Political and expert discussions frequently neglect the fact that false orientations of institutions of this kind, given the disparity between cost and return, could be corrected by corresponding adaptation of training periods, by extending the duration of training in those cases in which costs are higher than returns and by shortening training periods in which a shorter training duration will clearly suffice in order to impart the necessary theoretical and practical training. Here it should be borne in mind that a financing concept is linked to a training place in the sense that the individual by means of the growing productivity of his performance within the company during the training period in fact pays for the costs of his training, including its pre-financing.

The more the trainee owes the company in terms of costs, the surer the company will be that the trainee will remain with the company for a certain period of time as a skilled employee on completion of the vocational training programme. If in-company training fulfils this function, then it makes sense not to establish a direct comparison of costs and returns but rather to encourage the training company to win the trainee as a long term employee. Otherwise there will be a trend towards a development in which in-company training is undertaken less for the company's own requirements and far more for the anonymous market. The in-company training willingness then loses its signal function in respect of future qualification requirements and training in the company will be separated more from an individual's social or production process so as to prevent the increased drain of internal company knowledge from the company. The opposition to financing by means of a levy, as has been observed in Germany, may therefore be justified. Given the difficult labour market situation in Europe, there are several signs that there are far better chances of a German trainee obtaining a job after undergoing dual vocational training compared with a trainee in France. This can be attributed to the fact that in-company vocational training is coupled with the covering of the long-term need for qualified junior staff. Even if it were the case that this were linked in Germany with higher unemployment than in France, this does however offer the economic advantage of helping new technologies and organisational forms to establish themselves with this junior staff and hence of increasing productivity, innovative capacity and competitiveness as well as economic growth.

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[13] What should be noted in this context is the situation in which companies because of the moral pressure of entrepreneurial associations as a whole, political circles and the general public train more young people than they need in order to prevent youth unemployment.

9. FRAMEWORK CONDITIONS AND THE COSTS AND BENEFITS FOR THE INDIVIDUAL UNDERGOING INITIAL OR CONTINUING VOCATIONAL TRAINING

As already mentioned at the beginning, vocational training aims to equip the individual with knowledge and skills which will enable him to increase his performance, to work more productively and augment his own income and also his contribution to common prosperity. If investment in vocational training is to generate as high a return as possible, then it is very important for the individual undergoing initial or continuing training that the institutional conditions are shaped in such a way that the individual can draw the best possible benefit from his natural talents and abilities in the interests of himself and other members of society. The precondition for this is making costs and benefits as transparent as possible.

One of the main preconditions to creating this incentive is the right of ownership to the knowledge and skills acquired. The constitution of free States protect this fundamental right to the integrity of the individual and the ban on forcing people to use their knowledge and skills (ban on forced labour, slavery, free selection of occupation). Moreover, highly developed industrial countries protect the monetary income generated by work from a certain scale upwards against creditors (non-seizable income). Under these conditions there is considerable incentive for the individual to invest in vocational training taking into account his own aptitudes and skills and to search for the best possible opportunities to use them in the employment system. If the other institutional conditions are met (free choice of workplace, freedom to pursue an occupation, private ownership of the means of production), this will lead to relatively large scale prosperity whereby, depending on the cultural traditions of a country, the detailed provisions of these rights may vary.

9.1 Obstacles to the financing of vocational training

The rights anchored in the constitution do, however, lead to some difficulties when it comes to financing investment in vocational training which must be overcome by means of suitable State measures and institutional steps.

Initially it seems clear that the individual who owns the property and access rights to skills or knowledge which have been acquired, will also determine in the final instance the location, time, type and intensity of their use and that he will also have to shoulder the costs of the acquisition of this knowledge and skills. Since, however, these costs occur before any return, this leads to a financing problem. This may take on major proportions since in the case of school, academic and vocational training, costs may accumulate over several years before the first return can be generated in the form of monetary income.

The real difficulty emerges, however, when financing vocational training as a consequence of the property rights scarcely permits financing via the capital markets in contrast to financing fixed asset investment. Statutory protection of the individual only allows for financing from his own funds or from the funds of his family - not however financing on the basis of acquired human assets. In the case of fixed asset investment the matter itself may serve as a security for the lender. The fact that acquired knowledge and skills are not sufficient to give access to a loan creates difficulties for the individual, particularly young penniless people and, without any external aid, and prevents investment in education which, by extension, increases prosperity.

Institutional economics see this problem as the main reason why the State (tax payers) has assumed responsibility for financing the costs of in-school education and why the employer, as the pre-financing source, assumes the costs for the in-company part of initial and, in some cases, continuing vocational training which must later be covered by productive contributions to performance with correspondingly lower remuneration for the individual.

In the case of in-school and academic vocational education this means that the interest of the pupil or student or, in the case of minors, of the parents in the performance and economic return drops when school resources are scarce. In administrative terms it is difficult to monitor the performance of the school or university. So far there has been no incentive whatsoever to make provisions which could lead to a higher cost and performance transparency of State and other public schools and universities. The fact that this situation continues even today has to do with the fact that the schools and the State, i.e. the performance processes in the school and university, and State monitoring and financing of school are not separate from one another. At the same time, the State is the body which produces school services, which finances and bears responsibility for performance and which therefore monitors this and is only sporadically subject to general political control by the electorate for whom education policy is just one item in a party's manifesto. Competition between schools plays a role at best when there is a shortage of pupils but it is not a characteristic of the system and is not used to improve performance, to access information, to competitively assess expectations about the desired training objectives, methods, suitable teachers or pupils etc. A further consequence of this method of funding is finally that the pupils or their parents are viewed merely as the target group for the service and not as "clients". Even the co-determination rights granted in some countries to pupils and parents were not able for various reasons to do very much (van Lith 1985, p. 98 ff.), not to mention introducing performance and cost transparency.

The financing problem of training investment described above and in historical terms the assumption of the church education monopoly by the State have meant that both components, education production and financing, have been merged and that the State has imposed its administrative principles (standardised management and instructions, chamber system) on the education system. In fact, it is only the financing issue (van Lith 1985) facing families, pupils, initial and continuing training and trainees, which speaks in favour of a State task, aside from establishing and maintaining order, in which there is a clear allocation of rights and where education can fully develop its obligations.

Only recently (van Lith 1983/95, Mertens 1995) it was suggested that State funding in the form of institutional funding (financing of schools, staff, material resources directly by the State or municipalities) should be replaced by a financing in which the State or the competent municipality gives the users of vocational training institutes purpose-related resources (technically as training allowances, children's allowances, training certificates, deduction of training costs from taxable income, negative income tax etc.) (cf. van Lith 1985, pp. 127-262; specifically for training financing cf. Kath 1995) and places them on a par in respect of provision of funds with other training strands (polytechnic, university). The consequence would be that the individual who attends training is made more aware of the fact that the services he uses cost money. Vocational schools would orient themselves more towards the training needs of participants in initial and continuing training and would introduce more cost transparency if resources were only to be made available to schools on the basis of the free school choice of the individual.

9.2 Supply-oriented financing does not create cost awareness and transparency for improved cost-benefit assessment by the owners of human capital.

In terms of competition the financing of schools could also be shaped in such a way that the State and municipalities allocate funds on a school-place basis linked to the individual's choice of school. Cost awareness and a direct orientation towards the education wishes and preconditions of the individual person undergoing initial and continuing training would be less developed. Nor could the necessary transparency be established for a cost-benefit assessment by the individual as the owner of the human capital and there would be no possibilities of selecting a school or training place abroad perhaps in order to spend a year learning a foreign language. Nor would there be any competition in respect of services and costs between schools and training strands involving this kind of alternative.

9.3 Self contribution increases cost and return awareness

If depending on the economic circumstances, e.g. dependent on income, the State or municipality decides to introduce a certain self contribution by the trainee concerning the costs and if this is not a transitory item in the private budget, then this will strengthen, in addition to revealing the costs of initial and continuing training, the economic handling of scarce resources. Cost awareness would not only be increased by means of an individual's own contribution (loss of time which could have been used in a different way) but also by the resources (school, study place) which up to now have been used as a matter of course and in a generous way at the taxpayer's expense. This resource would increase in subjective value and would also encourage schools to use this scarce resource more economically.

The greater the role that the school part of training plays in terms of costs, the greater its proportion in training. In the dual vocational training according to the German model this is a lower proportion than in the case of the French or Danish vocational training. Also in comparison with initial and continuing training at universities and polytechnics, the institutional costs of which are scarcely known even today and which are only borne to a very limited degree by the users, the school costs of vocational training are low.

9.4 In-company part of vocational training

The situation looks different from the angle of the individual in respect of the in-company part of initial and continuing training. The costs of in-company vocational training are not directly known although perhaps more is known about continuing training than initial training. The individual company is, however, interested in making viable economic use of the resources made available for in-company initial and continuing training. Furthermore, the trainee knows that he must convince his employer by means of his performance particularly if he wants to improve his career opportunities on completion of training. Furthermore, the training contract also outlines the obligations which the two parties have entered into.

However, in this context the question is raised whether the trainee should in principle contribute to the costs of vocational training in those cases in which the expectations of his employer are negative concerning the medium to long-term economic advantage in terms of a training return (unfavourable social prospects, higher training costs than return). The training allowance which used to be a cost contribution, played this function when it did not have to be paid as entrance money to closed (handed down) apprentice markets. By banning apprenticeship payments the State has removed this opportunity for compensation to the extent that it was attributed to a real shortage of training places, but at the same time by subsidising training places it has consistently assumed the function itself of financing some of the costs of training places or even entire training places for trainees. Given the financing problems described above this financing function makes economic sense and promotes welfare. It does not however justify any intervention in vocational training since it is a subsidiary function of the State when financing the vocational training of young people.

From the economic angle the question is raised both in the case of school and the in-company part of vocational training whether funding by the State should be rendered more transparent for the individual and submitted to an assessment in order to increase the allocation of costs and benefits and by extension, the net earning power of this investment. Furthermore ,we should examine whether a fund should be set up which would be open to all trainees up to a specific level if they so desire. People who take advantage of this would then pay back a certain amount from their later income which strictly speaking would cover capital and interest and would facilitate the assessment of costs and returns. The State would be free to grant relief according to social criteria which would, however, be transparent in contrast to the current situation and would be more readily understandable in terms of their distributive target accuracy (van Lith 1983). This would raise the question to what extent this allocation and transparency are desired. The scope could be decided freely, however, a lack of transparency must be weighed against a loss of efficiency.

Whereas in economic terms it is undoubtedly the case that greater transparency and better allocation of costs make sense above all for the school and academic part of vocational training, this is not necessarily the case for the in-company part within the dual system.

In-company training in the dual system is a concept which links training and financing and, therefore, assumes an orientative function in the control of qualifications even if there are limits (cf. contribution by Kau, in this volume). The training company does not just offer a training place but also its financing. It assumes that the training costs and their pre-financing are worthwhile because the expected productive return during the later phase of training and, with a certain degree of probability later on, too, including costs saved in respect of external recruitment of staff etc., will be higher than the costs. Both sides would therefore have an advantage, both the trainee and the training company. One advantage of this system is that young people on completion of general education are informed which companies are indeed looking for junior staff in which occupations, which confirm this by their willingness to pre-finance training and, at the same time, with the conclusion of the training contract positively assess the individuals' characteristics in respect of being fundamentally suitable for training and later employment by the company. Both the indicated demand for qualifications, the financing function and information about the suitability of individuals interested in training are important elements of information in order to avoid mis-investment and help guarantee a net return for those involved. However this does require that companies offer training mainly along those lines. Demand which is solely based on gaining access to cheap labour during a training phase restricts this control function even if it does help to give young people an opportunity to make some form of transition to the employment system.

If we were to abandon the holistic training and financing concept of the dual system and to leave the financing of in-company training costs to a fund, which would cover the costs of the training place, companies would train on a scale and in areas which would have very little to do with the long-term needs for skilled staff. In-company initial training would become an activity pursued against remuneration without any obligation for the company to take the trainee over into permanent employment. Against this backdrop this "automatic" training would probably have the function of enabling companies to get to know junior staff and to recruit the trainees later if they prove suitable. There would be a continued incentive because they could save recruitment costs, erroneous recruitment and other costs. The control function exerted on resources by the dual training system is largely lost with the consequence that the trainees have to run a greater risk of training "which does not meet demand". This leads to unsure returns in conjunction with costs which have to be borne by the community (trainee or employer). A fund of this kind for trainees and future employers would be able to limit the net costs of training but it would not be easy to identify costs and returns.

A fund financed by employees themselves would be a substitute (in whole or in part) for State subsidy programmes and would release employers from additional costs which are a burden for them in times of poor economic growth and weak economic climate and would render them more open and ready to offer training. Above all there would be no threat of intervention by the fund or the State in vocational training which would mean there would be no opposition to a levy demanded by them. They would continue to be the sponsors of the in-company part of vocational training and offer training within the statutory framework on a contractual basis. They would not be forced to participate by means of a levy and no administration would be set up to distribute funds on the basis of specific criteria.

If a fund of this type were to be created to finance alternative initial and continuing training paths, above all for academic training, then a careful choice would have to be made between these training courses on the basis of an individual's talents and ability to perform and the hidden goals and educational investment would have to become far more calculable. Costs and return expectations would then be revealed on markets which scarcely existed so far.[14]

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[14] Systematic climbing on the bandwagon at the expense of others would no longer be possible at all or only to a very limited degree.

A switch of financing from the funding of institutions to the funding of initial and continuing training of the individual would increase his choices and, together with cost transparency, would promote the selection of a school and training place even beyond the political administrative borders within the European Union. Up to now the exchange between schools and training companies was undertaken on the basis of comparatively inefficient barters in kind. The precondition for this is that in a more or less random manner the interests of pupils or trainees are set against those of the partner schools and companies. It is the case that barter and exchange systems have developed in the European education system which also undertake complicated barter acts or three-way exchanges. However this situation in the education systems of what are otherwise highly developed monetary economies is very inefficient because it is cost intensive and, at the same time reduces return.[15]

If the individual, as the person benefiting from knowledge and know how, were to be justifiably called upon to bear more of the costs and return, then this implies that information about the individual's skills and the future of applicability of the knowledge and know how have to be improved. The incentive for the company, be it directly or indirectly (test institutes, assessment centres) to offer information about the suitability of individuals and about the opportunities for using the technical knowledge and skills acquired, would have to be increased. For these reasons vocational training will probably be shortened and reduced, more finely tuned or organised in a modular manner in order to quickly correct erroneous decisions and to make better use of new occupational opportunities by means of more precise co-ordination with qualification requirements. But also back-up measures such as timely and more diverse information about prosperous occupational areas of activity should emerge and the irrational dreams which are often observed and which are far away from the occupational reality could be channelled more quickly into realistic spheres[16].

10. THE INFLUENCE OF TAXES ON THE COSTS AND RETURNS OF VOCATIONAL TRAINING INVESTMENTS

From the macro-economic angle it is desirable to ensure that the scarce resources of an economy are used as efficiently as possible for the development of human and real capital. This calls for the balanced and harmonised production of human and real capital. Only in this way can the national economy achieve the highest possible return and prosperity with the given resources. It has already been pointed out that special problems arise for the financing of educational investments because of property rights in respect of educational investment. This calls for special arrangements to be taken by the State. Furthermore it is also necessary for the State to shape its tax and levy system in such a way that erroneous developments or distortions in the development of human and real capital will be avoided.

Fiscal policy has by no means insignificant effects on the costs and return of educational investments. If a national economy moves from a progressive fiscal system to a less progressive one, it is to be expected that macro-economically the human capital will increase because for large areas of the population the net earnings flow after tax, i.e. available income, will also increase. At the same time, there will probably be a negative effect on vocational training investments by the lower qualified who are placed in the less favourable situation by changes of this kind to the fiscal system. If the tax system moves in its weighting from the taxation of income to a greater taxation of consumption, then investment in human capital will be strengthened. However this will lead to greater income inequalities between the skilled and unskilled since further investments in vocational training for the latter will be less profitable. If training costs, study fees etc. are tax-deductible, then this will encourage investments in human capital.

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[15] The consequences would be the faster and more cost-effective acquisition of languages and the understanding of other countries, social contacts beyond national boundaries and thus the promotion of social integration and cohesion, of political and economic understanding but above all increased competition between schools and training strands

[16] Survey by the German Youth Institute: Fit to start a career? Occupational choice and occupational guidance from the pupils' angle, Material from labour market and occupational research, number 3, Nuremberg 1996

As a rule tax systems give priority to individuals from better off families and more highly skilled workers rather than to the less skilled. The latter benefit from State expenditure policy by means of the social transfer.

Compared to the incentive effects which fiscal policy has on investments in real capital, the effects of taxes on investments in vocational training are limited. This may have something to do with the fact that up to now education was regarded as a State task and the State along with municipalities operated schools as part of the administration and financed them from funds from the State or municipal budget. If this subsidiary function, which the State has assumed in financing for the above reasons and which can best be undertaken by means of a "public education bank", is then made separate, then the task of the State within the framework of fiscal policy will be reduced to the tax processing of education investment or the granting of subsidies for specific services which are not spontaneously offered by the decentralised education system and to distributive measures within the framework of the goal of social justice.

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COSTS AND BENEFITS OF VOCATIONAL EDUCATION AND TRAINING AT THE MICROECONOMIC LEVEL

Winand KAU (BIBB)

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1. INTRODUCTION

Society as a whole spends large amounts on education and training: the state and private organizations on schools and universities; employment authorities on retraining, further training and upgrading; enterprises on the initial and continuing training of their employees; private individuals on their own continuing training. This spending is an investment in the human capital of individuals and of the economy as a whole. The economics of education and training invariably focus explicitly or implicitly on the benefits, or rates of return, of these investments. The rate of return is the capitalized difference between cost and benefits.

This contribution looks only at the financial aspects of costs and benefits in vocational education and training. The economic costs are compared only with the economic benefits, although benefits also exist at the societal and cultural levels and are very important for the functioning of a community. Financial benefits are taken to encompass the microeconomic benefits accruing to enterprises and employees, as well as macroeconomic, or social, benefits.

Spending on education and training is intended to create a capable working population. The economic benefits are reaped in enterprises, practices and administrative bodies in conjunction with other production factors from the work performed by the vocationally qualified. The benefits can therefore be analysed at three levels. At the first level, they are expressed in growing labour productivity and rising profits (or falling losses). The second form of benefits accrues to the employees in the shape of higher wages and salaries, and the third to the state through revenues from taxes and duties, and lower expenditure on social security benefits. The range of costs and benefits can thus be examined in two dimensions which may be represented by the questions: "what benefits?" and "whose benefits?".

For enterprises, initial and continuing training are forms of personnel recruitment.[1] They are also the two parts of an investment in an enterprise's human resources. We can only speak of benefits if we know the costs of investments which aim to yield these benefits. Only very few accounting departments keep track of these costs. That would call for the separate accounting of human capital. The ability to manage human resources is closely associated with the standard of training accounts. And this in turn is conditional on an awareness of the complete breakdown of costs, yields and benefits associated with training. The focal problems of enterprise cost and benefit accounting have to do with the difficulties of drawing up balance sheets/bookkeeping on the benefits side. Balance sheet problems may mean that enterprises are unaware of the real value of their investment in human capital. If they concentrate in these circumstances on partial balance sheets and the short term rather than the long term, as they ought to, they are likely to make wrong decisions.

At the second cost-benefit level we find the working population. Their costs include in particular all forms of lost income and the immediate expenses incurred in the training process, including the cost of living. Pupils and students receive no or only a small income from their work. They themselves or third parties (parents, state) bear the direct costs associated with the pursuit of education and training. Trainees may receive a nominal payment which they earn, for the most part, through the productive work they do while training. It is instrumental for a personal cost-benefit analysis to distinguish between the various training paths, which are of course rather numerous. Examples:

a) School qualifications → no training → semiskilling → work
b) School qualifications → apprenticeship → skilled worker/skilled employee
c) Lower/intermediate secondary school qualifications → apprenticeship → master craftsman
d) University entrance qualifications → apprenticeship → additional training → occupation
e) University entrance qualifications → apprenticeship → higher education → executive position
f) University entrance qualifications → higher education → executive position

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[1] D. Sadowski: *Berufliche Bildung und betriebliches Bildungsbudget*, Stuttgart 1980, pp. 53 ff. Organisatie voor Strategisch Arbeidsmarktonderzoek (OSA): *Economic Returns of Education and Allocation of Labour. English Summary of the OSA-Report No 19*, The Hague, May 1994, pp. 1 ff.

These examples illustrate that there are two ways of looking at the benefits of training. The first, which is marginal in one sense, answers the question of what benefits are to be obtained from adding a further stage to the training path already completed. The second is more typical and concerned with the incomes to be obtained from specific training routes. A comparison is made between the incomes attained at 30 years of age and those resulting from the next lower training path. This may be, for example, the benefits of an enterprise-based apprenticeship on the road to an academic qualification (path 6 compared with path 5). The additional income minus the costs of training produces (allowing for interest) the return on the training investment.

From a macroeconomic viewpoint, investments in education and training are, to a certain degree, investments in the infrastructure, and the return on such investments becomes apparent only in the long term. The concept of benefits also includes other aspects which need to be kept apart. It is helpful in the first instance to distinguish between the benefits resulting from the efficiency of the education system and its quantitative performance, on the one hand, and the benefits in terms of subsequent yields (economic growth, low unemployment, tax revenues) on the other. The efficiency benefit is the ability of the education and training system to train the younger generation in "suitable" institutions so as to minimize the costs of students repeating classes or dropping out of higher education and thus reduce excessively long education and training periods.

The benefits from vocational education and training are also associated with the allocative functions of the labour market. One function of vocational education and training is to ensure that the supply of labour matches demand. A training system should at least produce approximately those qualifications which are required on the labour market. There are therefore two sides to the benefits of investments in training. In formal terms, the benefit is the return on a long-term investment, but this return results from the allocative effects of the labour market. It would be an excessively narrow perspective if researchers were to look only at the return on investment in terms of human capital. And concentrating exclusively on the allocative aspects of the labour market would ignore the fact that education and training are an investment in themselves.

There is also a third aspect to consider. Return on investment calculations can normally encompass only the direct costs and benefits, i. e. the returns of the first type. But investments in education and training also have effects on other areas. There may be positive or negative effects of a second type. Positive (synergy) effects occur when investments in education and training at one point raise productivity at another. These include in particular education and training investments which equip their recipients to work in research and development. Negative secondary effects occur in the form of redundancies when lesser qualified employees are replaced by their more qualified counterparts.

2. COSTS AND BENEFITS TO ENTERPRISES

2.1 Theoretical foundation of initial and continuing training in German enterprises based on existing approaches to human capital theory

Figure 1 (p. 227)[2] depicts the neoclassical theory of investments as a basis for corporate growth. In a highly simplified form, the cause and effect relationships can be described as follows. Corporate growth depends:

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[2] The flowchart is produced by disaggregation of a diagram from the "new theory of endogeneous growth" by M. Graff: *Bildung und technischer Fortschritt als Determinanten wirtschaftlicher Entwicklung*; cited in M. Tessaring: *The Relationship between Education, Training, Employment and the Labour Market - Some Research Findings and Conclusions* p. 22. Cf. also P. Romer: "Endogenous Technological Change", *Journal of Political Economy*, 98/1990, pp. 297 ff. and G. Ballot, F. Fakhfakh, E. Taymaz: *Firms Human Capital, R&D and Performance: An International and Comparative Study*. Paper presented at the Maastricht Conference of the Applied Econometrics Association, 14 - 16 May 1997. On the last point cf. Section 4.7 ("A look at outstanding issues and conclusions").

- on personnel investments (recruitment, initial and continuing training);
- on net investments in equipment, buildings, participating interests, manufacturing capacity abroad;
- on innovations (introduction of new production processes including new forms of work organization, new products, distribution and marketing channels);
- and on investments in research, development and licences from other companies.

These investments become part of the production factors, i.e. they increase the human capital, the capital stock, the company's technical and organizational experience and expertise, and thus change capacity and efficiency. Production and capacity determine the utilization rate of capital assets and development of profits, which in turn help to fuel corporate growth.

Growth therefore depends, among other things, on the economic success of human capital investments, or on the difference between discounted cost and benefit flows. Costs in this conjunction mean the assessed consumption of corporate resources, and benefits the assessed yields, savings in opportunity costs and competitive edges resulting from higher productivity and rising efficiency. The last magnitude, however, cannot normally be quantified, since the efficiency of human resources also depends on a number of very complex factors which cannot be evaluated in monetary terms, although they are vital to the enterprise's survival. If they are to be quantifiable, effects which can be assessed must be matched with causes which can be determined and isolated. But this is not possible for many elements of training, such as most core skills.

Companies normally have a choice of three ways to cover their personnel requirements. They can look for skilled workers on the external labour market and give them induction training. They can train school-leavers in a recognized training occupation and employ them upon completion of training, or they can give continuing training to existing employees with a view to equipping them with the new skills required. The choice between these three alternatives, however, is never a true option, since there is basically only one decision to be made. Companies can choose whether they wish to train or not. If they do not provide initial training, they must look for skilled employees on the external labour market or else provide further training for existing employees. If we choose to explain personnel recruitment behaviour by means of human capital theory, we must answer the question of why there are companies which invest in training school-leavers although they have no property rights over the qualifications produced.

To illustrate what this question means in business terms, we shall introduce the terms gross costs, yields and net costs, which will be examined in greater detail in Section 3. The gross costs of in-company training are made up of personnel costs (for the trainees and trainers), calculated capital costs, costs of materials and administration, and other costs for teaching materials, protective clothing, fees payable to chambers, external courses, etc. Normally trainees are not just a cost factor for their enterprises. In the course of their training they generate returns through productive skilled or ancillary work, which have either a market or a calculated value. If the enterprise did not provide training, it would have to engage other personnel to perform this work. Since the trainees do not receive any extra payment for this work, but only the considerably lower (fixed) training remuneration, the returns are tantamount to indirect finance for the enterprise. However, the net costs (gross costs minus returns) are generally higher than zero, as will be explained below. The above question should therefore be understood as follows: Why are German companies prepared, positive net costs notwithstanding, to provide school-leavers with an average of three years' training which equips them to perform an occupation?

2.1.1 Becker's human capital model: the distinction between investments in training with a general market value and enterprise-specific training[3]

The present-day theory of corporate human capital draws on fundamental works by Schultz (1959), Mincer (1958, 1962) and particularly Becker (1962, 1975, 1983). In his model analysing on-the-job training, Becker distinguished between the general and the enterprise-specific usability of knowledge and skills. This model is based on personnel recruitment practices of US corporations, and we must examine closely which aspects can be applied to the German dual system.

According to Becker, generally applicable knowledge and skills have a market value because they can be used to increase production in many enterprises. The marginal product value from the additional employment of one skilled worker and the associated remuneration are, at least under neoclassical, or rather perfect, market conditions, identical in all enterprises. Under these highly specific conditions, enterprises derive no benefits from their training investments.

Enterprise-specific training contents, in contrast, are intimately associated with the workflows and qualification requirements of a certain enterprise and can be applied only in that enterprise. The investment in training is profitable for the enterprise for two reasons. Trainees contribute to the costs through the returns from their productive work and, second, the enterprise can pay the skilled workers on completion of training a wage below their marginal product value but above the income they could obtain elsewhere. Under these circumstances, the incentives for trainees and enterprise to part company at the end of training are low. If newly qualified skilled workers were to leave, they would lose their contribution to the training investment and their above-average wages. And the enterprise, by choosing to part with its newly qualified skilled workers, would be foregoing the difference between their marginal products and their wages.

The conclusions to be drawn from Becker's model are therefore quite straightforward: A rationally calculating entrepreneur will not be prepared to invest in training generally marketable skills unless the costs are borne by the trainees themselves in the form of sufficient returns. Training skills which can be applied only in the specific enterprise, however, is a rewarding investment since, upon completion of training, the skilled workers can be paid a wage below their marginal product value. The difference is the benefit accruing to the enterprise from the investment. The difference between the wage earned in the specific enterprise and that they would earn elsewhere is the benefit of the investment for the employees.

2.1.2 Applicability of Becker's model to the German dual system

Is in-company training under the dual system an investment in general or specific human capital? German literature on the subject often stresses the former aspect, arguing that enterprise-specific knowledge and skills play only a marginal role in training. The dual system, so the argument continues, is geared to a relatively small number of 364 recognized training occupations, often with high substitution potential, compared with a total of approx. 25 000 "adult" occupations (Kempf 1983, 1985; Lehne 1991).

This would certainly seem to be true with regard to the intentions of the German Vocational Training Act. The training ordinances which regulate the system have virtually the status of laws. They have a standardizing effect, apply throughout the country, and the examination requirements ensure that training is independent of regional, sectoral and enterprise-specific peculiarities. In order to achieve this, the training ordinances include skeleton curricula reflecting the substantive aspects of training occupations. These are not structured according to specific jobs or workplaces, but serve specific learning objectives. However, the training ordinances are not 100 per cent binding. The skeleton training curriculum serves rather as a guideline. Enterprises can depart from the course schedule and the material covered in line with their own requirements, gearing training more closely to their own specific investments. They only need to ensure that trainees pass the examination. The learning objectives are minimum standards. Enterprises may not fall below them, but they certainly can rise above them.

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[3] Cf. in particular the fundamental work by D. Sadowski: *Berufliche Bildung und betriebliches Bildungsbudget*, Stuttgart 1980, pp. 9 ff. Cf. also H. Maier: *Bildungsökonomie*, Stuttgart 1994, pp. 43 ff. S. Grossmann and H.L. Meyer: *Kosten und Nutzen der betrieblichen Berufsausbildung, eine theoretische und empirische Analyse*. Dissertation, Hannover 1996, pp. 21 ff. The modelling of human capital theory below is based largely on the last-named study and the literature to which it refers.

However, the conclusions suggested by Becker's model are considerably at odds with empirical findings. German enterprises continue to provide training on a huge scale, although there is a general downward trend, particularly in small enterprises. All in all, i.e. including one-person enterprises, 23.7 per cent of companies provided training in 1995 (1990: 28.3 %). The reasons for this development are the structural decline in employment, particularly in craft trades.[4]

Proportion of training enterprises in %	1990	1995
Enterprises with 1 to 9 employees	21.4	16.9
with 10 to 49 employees	51.7	46.5
with 50 to 499 employees	73.6	67.6
with 500 or more employees	94.0	93.8

The proportion of trainees in the economy as a whole (= share of trainees in the workforce generally) currently stands at approx. 5 to 6 per cent (1990: 7 per cent). Almost two thirds of school-leavers in any year in Germany start their occupational life with craft trade, technical or commercial/administrative training. But a distinction needs to be made in this context at least between training in craft trade enterprises and that in big companies.

For many - if not all - craft trade enterprises trainees are a source of inexpensive labour (this is fiercely, but not convincingly, disputed by master craftsmen). Since training in the craft trades is provided at the workplace or in the context of actual orders, the returns are much higher than in large enterprises. Master craftsmen have every interest in minimizing training remuneration and the time spent at vocational school while maximizing the average period of training, because trainees become profit factors from the third year of training if not before. All these factors suggest that the returns are one, if not the only, motive for training in the craft trades. Craft trade enterprises are good examples of training in generally applicable skills. They become unwilling to offer training if the returns do not cover their costs.

Large enterprises, by contrast, mainly provide training in training workshops and in-company training centres. The training costs are quite considerable, and returns do no more than help to cut these costs. According to Becker's model, training in large enterprises must therefore be enterprise-specific training, although the generalizing intentions of the German Vocational Training Act apply here, too. How is this discrepancy to be understood?

2.1.3 Extension of Becker's model having regard for market imperfections

There are many different ways of resolving the incompatibility of theory and practice in training by large enterprises. One is a kind of aggregation effect which Becker and others have overlooked. Even if all training is "general" in Becker's terms, it is still worthwhile for the individual enterprise provided the likelihood of losing an employee to another enterprise on completion of training is no greater than that of gaining an employee who has been trained elsewhere. The question, however, is: how far must the dual system proliferate or penetrate the economy as a whole before this aggregation effect becomes noticeable at the individual enterprise level? There must be something like a "critical mass" of training enterprises if the system is to sustain itself. If all enterprises provide training, this condition is satisfied, but if only one does so, the likelihood of losing trainees is virtually 100 per cent. It may be that this "critical mass" has just been reached in Germany. Of the larger enterprises with around 500 or more employees, almost all provide training, while one in two craft trade enterprises continue to do so. It is mainly the very small (one-person) industrial enterprises which provide no training.

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[4] Cf. Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie: *Berufsbildungsbericht 1997*, Section 4.4, "Ausbildungsbeteiligung von Betrieben", pp. 136 ff.

The second way of extending Becker's model is to omit the neoclassical assumption of perfect markets (Eckaus 1963, Oatey 1970). If employees are immobile and do not immediately take alternative employment where they can earn more elsewhere, training enterprises can pay lower wages than others, so that even generally marketable vocational training becomes profitable.

Enterprise training practices therefore depend not on factors associated with the marketability of the training provided, but on whether qualified employees have a higher or lower degree of mobility. The model has an explanatory value not to the extent that newly qualified trainees *can* leave the training enterprise in order to offer their qualifications for their own benefit elsewhere, but only to the extent and under what conditions they actually do so. If all trainees leave after the examination, the enterprise will discontinue training where it incurs positive net costs. If all of them stay, training will be a profitable investment whether general or not. General training in terms of course content is therefore not the same as general training in terms of mobility and marketability. Winterhager (1969) and Meyer (1977) take a similar view. They distinguish between market imperfections which are inherent in the system and imperfections resulting from entrepreneurial behaviour. The limited market rationality of enterprises and employees is an inherent constraint.

A market imperfection arises when enterprises do not know their own training costs. Training costs do not normally figure separately in corporate accounts. Relevant studies (von Bardeleben et al. 1995) indicate that only a small minority of companies have a complete picture of their training costs. Most are aware of the personnel costs of trainees and full-time trainers, and possibly the capital costs of their training workshop, but only very few make the effort to keep a record of personnel costs for part-time trainers and still fewer of training returns. It is a fact that enterprises have limited budgets for initial and continuing training and the available funds can only be spent once, either on training or on breaking down training costs in their bookkeeping. So enterprises provide training because they "have always done it" and because "it has proved worthwhile to train".

Excessive emphasis on the short-term quest for profits detracts from long-term planning and makes training costs and benefits still less calculable. Companies are increasingly less able to plan more or less reliably for the following year, let alone the year after that. This is associated, among other things, with the declining half-life of markets and with fashions, with the incalculable risks of technological change and the globalization of competition, e.g. due to the relocation of manufacturing operations abroad and - last but not least - with the emergence of just-in-time thinking. However, decisions on training investments are, by their nature, long-term. The human capital calculation suffers as the planning horizon is narrowed. Enterprises experience this as training insecurity. This may tempt them to look only at short-term profits, i.e. only the returns during the training period. The inevitable net costs then reinforce this trend to reduce the number of training places although, seen from a long-term perspective, it is a strategic error.

But there are also other forms of imperfection. Big companies in particular which have a public reputation to lose often cite their social responsibility as trainers of young people. They offer additional training places even when they do not need additional trained personnel.

Neither are the trainees themselves always rational. Questioned about their motives and behaviour (Herget 1994), they repeatedly reply that income is only one of several considerations. They also set great store by interesting and varied duties, independence in performing their work and opportunities for promotion within the enterprise. Young workers are very often prepared to accept lower wages than they could obtain elsewhere when they like the atmosphere at work, out of a sense of identification with their company, due to job security and the costs of looking for alternative employment, or because of the social and family frictions associated with a change of job. Other reasons which may persuade skilled workers to remain with their training enterprise are contractual provisions on a minimum period of service, long-service bonuses, profit sharing and company pension schemes.

2.1.4 Extension of Becker's model having regard for saved opportunity costs

A major defect of Becker's approach to human capital is that he omitted to include saved opportunity costs in the benefits. Training enterprises save the costs which non-training enterprises have to invest in personnel recruitment (costs of looking for suitable employees, induction and continuing training costs). A theoretical model of the economic benefits of training investments to an enterprise is only complete if it includes opportunity returns, too.

The latest study by Franz and Soskice (1995) in particular stresses the specific nature of the German dual system. They reach three conclusions. First, it is profitable to teach specific knowledge and skills as part of an initial training programme where this is less expensive than the continuing training of new recruits who have already completed initial training. Section 3 below looks at empirical studies which confirm this is one distinguishing feature of the German training system. Second, the authors claim that, since general and specific skills are complementary, the former can be learned only in conjunction with the latter. Given the changes in work organization which occurred with the introduction of team production methods in which teams are wholly or partly autonomous in their responsibility for quality, their time input and continuing training, there are convincing examples (Kern/Schumann 1984, Schumann et al. 1994) to support this, too. These teams demand from skilled workers not only (general) occupation-specific competencies, but most notably mutlifunctionality, the ability to fit into a team, communicate and work independently.

These traits as such are core skills which extend beyond the boundaries of specific occupations. Although this seems to suggest they have a general market value, they are in fact qualifications embedded in a specific context. Core skills are brought out in a familiar and internalized communication context, which is highly specific. During the latest interviews conducted by the Federal Institute for Vocational Training (Kau et al. 1998) with major industrial enterprises and focusing on a suspected change in the training behaviour of large enterprises, it was repeatedly stated that the dual system is very useful for introducing team production in industry. High expectations were placed in the rationalization effect to be attained from manufacturing in teams. Respondents believed 60 to 80 per cent of production could be performed by teams, increasing labour productivity by up to 30 per cent.

Franz and Soskice (1995), as well as Sadowksi (1980) earlier, extended Becker's model by a third, institutional aspect. One of the major features of the German labour market is the high hurdle of protection against dismissal. After the end of the trial period, it is difficult and expensive for German enterprises to dismiss skilled workers they have engaged indefinitely. The labour courts provide a large body of case law, and except where dismissals occur for operational reasons, notably a decline in orders, enterprises have little chance of obtaining property rights from employment contracts. Recent attempts to introduce greater flexibility through legislative provisions on temporary contracts have provided some relief without changing the situation fundamentally.

From the viewpoint of the enterprise, the only way to avoid the disadvantages of an inflexible labour market is in-company training. The training market is absolutely flexible. Trainees conclude a training contract with an enterprise. There is no need for dismissal at the end of training. Trained workers can remain with their training enterprise only if it formally recruits them and gives them an employment contract.

This fact gives training enterprises a highly effective selection mechanism which is not available to those companies which provide no training. Young people can be moulded, and the enterprises have three to four years to test them inside and out. The enterprise recruits only those newly qualified workers whose skills and character promise good prospects. Non-training enterprises run a much higher risk of recruiting unsuitable personnel. It is therefore hardly surprising that many enterprises, particularly large ones, have made a virtue out of a necessity and now supply all their own young recruits. For some years now, recruitment by such enterprises of staff trained in other enterprises has been the absolute exception.

The conclusion from what has been said above is quite clear. For larger companies, the German apprentice system is basically an investment in specific human capital. This is the only explanation for the empirical findings described in the next chapter. The qualifications obtained benefit other enterprises only if the training enterprise does not wish to take on previous trainees as part of its permanent workforce. At the same time, there are quite a number of young people who voluntarily leave their training enterprise because they wish to go on to higher education. However, training enterprises make a considerable effort to re-recruit them after graduation.

2.2 Results of empirical cost and benefit estimates for Germany

2.2.1 In-company vocational training

a) Available data

Enterprise training costs in Germany are note a subject-matter of official statistics. They are established in infrequent surveys by the relevant research institutes. Five major surveys have been carried out to date:

- In 1971, the Expert Commission on Costs and Financing of Vocational Education and Training developed the first economic net cost model for in-company training and estimated the costs of training in industry, commerce and craft trades based on a statistically representative survey of enterprises (Sachverständigenkommission 1974). The net costs to enterprises were calculated by subtracting the training returns from the gross costs.
- Following the method employed in this standard work, two further cost estimates were drawn up in 1980, one by the Federal Institute for Vocational Training (BIBB) (Noll et al. 1980) and the other by the Institute of the German Economy (IW) (von Bardeleben et al. 1995, 1997; Kau 1994). They were based on separate representative surveys.
- Another poll (oral, 1500 enterprises, representative of training sectors in industry/commerce and craft trades in western Germany) was conducted in 1991 by BIBB, and three years later the figures were recalculated at constant structures based on the situation in 1991 and at constant 1995 prices.[5] The assumption of constancy was based on the experience that actual enterprise structures, such as the duration of vocational school and in-company instruction time, the productive working time of trainees in the enterprise and the time spent by part-time trainers instructing and supervising trainees change only slowly.

For various reasons, the different surveys are comparable only to a limited extent. However, Figure 2 (p. 228) gives a rough idea of the costs trend from 1971 to 1995.

b) Breakdown of in-company training costs in industry, commerce and craft trades

b 1) The cost model

The gross costs part of the corporate costs model (cf. Figure 3, p. 229) consists of

- personnel costs for trainees
- personnel costs for full, part-time and external trainers
- capital and material costs
- and a number of other cost types.

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[5] R. von Bardeleben et al.: "Betriebliche Kosten und Nutzen der Ausbildung (1991)." In: Bundesinstitut für Berufsbildung (ed.), *Berichte zur beruflichen Bildung*, No. 187, Berlin and Bonn 1995. W. Kau: "Kosten und Nutzen der betrieblichen Berufsausbildung - Ergebnisse der Sachverständigenanhörungen." In: *Berufsbildung in Wissenschaft und Praxis*, No. 3/1994, pp. 12 ff. R. von Bardeleben et al.: "Was kostet die betriebliche Ausbildung; Fortschreibung der Ergebnisse 1991 auf den Stand 1995." In: Bundesinstitut für Berufsbildung (ed.), *Berichte zur beruflichen Bildung*, No. 210, Berlin and Bonn 1997.

A proportion of the gross costs are incurred regardless of whether or not an enterprise provides training. These include personnel costs for part-time trainers and pro rata costs of training administration (cf. grey-shaded boxes in Figure 3, p. 229). Part-time trainers are experienced skilled workers who have completed vocational training and perform their regular occupational duties at the enterprise while instructing trainees for brief periods whenever the need arises. The enterprise needs these skilled workers, even if it has no apprentices under contract. Therefore they entail almost no extra costs and are irrelevant for decision-making purposes.

Corporate accounts in the strict sense must include all costs incurred. The result is what is known as absorption costing (full cost accounting). If the cost elements which play no role in decision-making are omitted, we have partial cost accounting. Net costs can be calculated according to the full (absorption) or the partial costing method, depending on the approach to gross costs.

The benefits side of training is based on the value added work of trainees in production and commercial departments. This is weighed up against the costs which the enterprise would have incurred had it engaged employees on full pay instead of the trainees to perform the work. A distinction is drawn in this context between ancillary and skilled work. Three types of information are required to calculate the yield: first, the apprentice's productive working time in hours per year, subdivided according to ancillary and skilled work, calculated by subtracting the time the apprentice spends attending vocational school and receiving in-company instruction, e.g. in the training workshop, as well as holidays and days lost through illness, from the number of working hours stipulated in the training contract. Second, a measure of the apprentice's output on a progressive scale according to the year of training, and third, the costs of employing a trained skilled worker or an ancillary worker on full pay for the same periods. These three components produce the annual per capita returns on training. The calculated net training returns are subtracted from the aforementioned gross costs to establish the net costs.

b 2) Survey results

Tables 1 and 2 (pp. 234-235) indicate the gross and net costs for 1991 (according to the full costing method) in industry/commerce (IC) and the craft trades (CT), while Tables 3 and 4 (pp. 236-237) give the results of a survey for selected industrial, commercial and craft trade occupations according to the partial and full costing methods.[6] The updated results for 1995 differ only in their absolute magnitude from the 1991 figures. They are, on average, 20 per cent higher. Since real structures were held constant, the proportions for the various items have changed only marginally.

According to the full costing method all forms of apprentice training entail positive net costs. The overall average (IC and CT) net training costs for 1991 were approx. DM 18 000 per capita and year. Assuming three years' training, this adds up to a grand total of approx. DM 54 000 (approx. DM 64 000 in 1995).[7]

The full net costs per capita and annum (1991) are more than 40 per cent higher in industry and commerce than in the craft trades, mainly due to higher personnel costs and lower returns. Only the craft trades reveal any considerable difference in the costs of training between technical and commercial occupations:

Average for all occupations	DM 20 509 (IC) versus DM 12 352 (CT)
Technical occupations	DM 20 479 (IC) versus DM 13 298 (CT)
Commercial occupations	DM 20 524 (IC) versus DM 7 436 (CT)

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[6] The surveys have been carried out by the German Federal Institute for Vocational Training (BIBB).

[7] Extrapolating these figures for the economy as a whole, which is possible only with severe limitations since industry, commerce and the craft trades are not entirely representative of enterprise training throughout Germany, we arrive at a grand total of approx. DM 30 billion for 1991. This represents approx. 1.9 per cent of all gross wages and salaries.

A completely different picture emerges when we look at partial costing. As explained above, most enterprises regard only the partial costs as a strain on their budgets. The remaining costs are incurred regardless whether training is provided or not. Variable costs are therefore the "sore point" when it comes to taking decisions on training. Tables 3 and 4 (pp. 236-237)give the training costs for selected industrial, commercial and craft trades occupations according both to the full costing and the partial costing methods.

The most interesting point is that the net partial costs in the crafts trades are mostly negative, or in other words training is a source of net revenues for craft trade enterprises. This explains, (1) why there is such a high proportion of apprentices in the craft trades, averaging 6 to 8 per cent of the total workforce in these sectors, (2) why craft trade enterprises retain a smaller share of apprentices than many industrial enterprises on completion of training, and (3) why training patterns in the craft trades run counter to economic cycles: the willingness of craft trade enterprises to provide training tends at least to rise in a recession and to fall in a boom.

Industry and commerce incur positive net costs, even considering only partial costs, and there are sometimes major differences between industrial and commercial occupations. In this conjunction, we must ask why enterprises are prepared to shoulder these costs. There may be any number of reasons. Some of them were examined when we looked at imperfect training markets in Sections 2.1.3 and 2.1.4. Other, and possibly more substantial, reasons are associated with the technical difficulties encountered in keeping track of costs and benefits. Apart from the actual returns which apprentices generate during training, there are a large number of benefits which are not felt until training is completed and the newly qualified skilled workers join the permanent workforce. However, the majority of these are so intricately associated with operational flows that they can be identified only in terms of quality. They do not figure in the books and cannot be measured in terms of value.

A case study of a major German industrial corporation carried out in 1991 revealed a substantial benefit factor which aroused considerable interest among German vocational training researchers (Cramer/Müller 1994; Müller 1996). In-house accounts were used for the first time to identify opportunity returns in the form of saved personnel procurement costs. These are the costs which non-training enterprises incur in recruiting skilled workers from the labour market and providing induction and continuing training for the new recruits. Training enterprises do not incur these costs. Since the industrial corporation in question both trains its own staff and recruits pretrained employees, the opportunity returns could be calculated directly from the corporate accounts. The study sought to analyse:

- the personnel recruitment costs per employee (advertising costs, time lost in preparing for, holding and assessing interviews, costs of administering and processing applications)
- additional wage costs incurred in persuading skilled workers to move from other companies (currently irrelevant due to high unemployment)
- costs of induction training, which do not arise or are lower for employees trained in-house
- continuing training costs (payment of wages for lost working time, seminar fees, expenses) for knowledge and skills already acquired by employees trained in-house.

The total value of these opportunity returns was up to DM 23 000 both for commercial and technical occupations in this industrial corporation. This covers only part of the full net costs incurred in three years of apprentice training, and the proportion is higher in commercial than in technical occupations since technology and equipment costs are higher in the latter sector. However, there are a number of other benefits of major strategic importance which generate savings that cannot be quantified.

Training is used as a means of selection with a view to developing a capable body of skilled workers. Companies engage permanently only those former apprentices who are likely to perform well, have the personality to fit in with the other employees at the enterprise and, in all probability, will identify with their company, thus keeping down staff turnover costs. The risk of an erroneous recruitment is considerably higher when employees are hired from outside. Enterprises get to know their apprentices better during training than they do outside recruits in the trial period.

It is easier to redeploy staff for technical and organizational reasons and to have them stand in for fellow workers who are on holiday or sick leave if they are familiar with the enterprise from their training. Training is very important for a company's image and its public reputation. Enterprises with a training record have an additional selling point and can make their presence felt more effectively at least on the regional labour market.

All the above points assume that an enterprise which does not provide training can readily find suitable new recruits on the labour market. This may well be true at times of high unemployment, but it is unlikely to apply in the long term. Whenever the economy shows an upward trend, it eventually reaches a point where the rise in output is limited by a shortage of manpower and delivery times are delayed. Continuous corporate investment in training provides an effective medium-term personnel planning instrument. However, it is completely impossible to assess those personnel planning benefits. Training enterprises are slower to suffer from shortages on the supply side of the labour market, and the impact is cushioned. The opportunity benefits may be many times higher than the training costs.

One of the focal problems of cost and benefit accounting for training decisions is the difficulty of drawing up balance sheets. This generally means that most enterprises are not aware of the true returns on their training investment or only have a rough idea at best. If they choose to concentrate under these circumstances on partial balance sheets and short-term considerations rather than the longer term, as they ought to, they are likely to make misguided decisions.

A second cost and benefit problem is that most enterprises do not treat apprentice training as a business investment. Training costs are not itemized in an accounting subsystem such as a separate human capital account, but are depreaciated in full in the year they arise, just like wages/salaries, consumption of materials and energy. If training were considered an investment, cost and benefit flows would be set against each other for a longer period as a basis for establishing depreciation rates. Enterprises choose not to do this because the temptation of immediate write-offs is too great.

Bearing these problems in mind, BIBB has decided to focus its future research into the economics of training on measuring the corporate benefits and, implicitly, on the conduct of accounts and auditing in the training field. BIBB will probably carry out the next cost surveys in the year 2000. The approach adopted by the "Commission of Experts", which originates from the seventies, is no longer sufficient for the poll of enterprises which this will involve. Answers need to be found to methodological issues involved in recording the benefits.

2.2.2 Costs and benefits of continuing training to enterprises

a) Cost model

Enterprises do not normally apply the strict business definition (= costed consumption of goods and services incurred in generating products) in connection with their training budgets. They tend instead to refer to costs when it is a question of charges or expenditure. It hardly needs to be stated that calculated costs exist which cannot be matched with any direct charge or investment. They take on the status of costs only when they become a depreciation factor. This blurring of terms simplifies day-to-day bookkeeping. It is acceptable to the extent that "continuing training costs", construed in this way, are used as a basis not for calculating prices and supply, but for training auditing and human capital accounting. Both are corporate and strategic management tools when assessing targets and performance.

The figures below are based on a continuing training survey (Weiß 1996) by the Institute of German Economy (IW) in 1993 for the industrial, commercial and craft trade sectors (written survey of 1450 enterprises representative of Germany as a whole). It follows on from similar surveys performed by the IW in the seventies and eighties. The survey looked at a broad package of cost types:

- costs of full and part-time continuing trainers
- costs of in-house and outside seminars
- costs of retraining
- costs of in-house and outside information events
- other costs, such as donations, payments to continuing training centres, grants

A distinction was drawn between direct and indirect (calculated) costs. While direct costs encompass all spending on personnel and materials in immediate conjunction with continuing training, indirect costs are the costs of wages for employees while they attend continuing training sessions. They are an indicator of the value of the work lost to the enterprise. They are calculated costs unmatched by any outlay. Since they do not make any additional demands on the continuing training budget, they are comparable with the personnel costs for part-time trainers of apprentices which, while not having any influence on decision-making, have led to a distinction being made between full cost and partial cost accounting.

Apart from indirect costs, there are also the calculated costs of learning in a work situation and the calculated costs of self-regulated learning. In both cases, it was assumed that the enterprise and employees share the costs. It was assumed for learning in a work situation that the productive work performed in this situation reduces the costs by half. It was likewise assumed that half of the time spent on self-regulated learning falls within non-working hours, halving the costs here, too. Both assumptions are arbitrary and without empirical foundation.

The problem with enquiries of this nature is that enterprises keep only fragmentary continuing training records. In the latest European continuing training survey (see below), only one in twenty enterprises had computerized records of continuing training events. Since many enterprises have to sift through large volumes of paper even to establish the attendance at continuing training sessions, such surveys often encounter considerable resistance. And that is not all. One of the problems encountered in surveys of initial training costs recurs with regard to the costs incurred in continuing training, too. The expenses involved do not feature as a separate part of company accounts, but are concealed in many other items, so that even most big companies can only provide estimates, with the risk of omitting certain items.

b) Results of the IW continuing training surveys

Table 5 (p. 238) looks at five different indicators of the costs listed above:

- costs per programme/event
- costs per employee
- costs per participant
- costs per participant-hour
- costs as a percentage of the gross wage and salary bill.

Not only the different indicators given in Table 5 (p. 238) are of interest, but also the continuing training costs per enterprise. The direct costs, including full and part-time trainers, were approx. DM 1210. The indirect costs of wages for employees in continuing training and retraining, of on-the-job training and self-regulated learning amounted to approx. DM 1640. This means that each enterprise spent a total of DM 2850 on the continuing training of its staff.

In the IW study, Weiss noted that there were some problems in extrapolating the results of the survey for the economy as a whole given incalculable errors in recording the costs in the enterprises. Another problem of a methodological nature is that unavailable information often has to be substituted by assumptions which cannot be verified. The IW went ahead with the extrapolation nonetheless, believing that it gave at least a rough idea of the sums involved.

Bearing in mind this qualification, it arrived at enterprise continuing training costs of approx. DM 36.5 billion throughout the economy as a whole. In-house and external training sessions accounted for about half, on-the-job training for 25 per cent and the cost of continuing trainers for 10 per cent of the total.

The statistical risks involved in surveys of enterprise continuing training become quite clear if we compare the IW survey with the German section of the three-stage FORCE survey of 1993/94. It consisted of a preliminary written survey in late 1993 (9300 enterprises), the main written survey by the Federal Statistical Office together with the Federal Institute for Vocational Training in 1994 (4100 enterprises) and a follow-up oral survey in 1995 (500 enterprises). The costs were recorded only for enterprise continuing training in the narrow sense (courses and seminars) in companies with 10 or more employees. Extrapolating the results for Germany as a whole produced continuing training costs just in excess of DM 9 billion. Grünewald/Moraal (1995) employed heuristic assumptions to estimate the costs of continuing training in enterprises not covered by the survey. They arrived at an additional sum of approx. DM 8 billion. This makes a grand total of DM 17 billion. The IW survey put this total at just under DM 23 billion.

The differences are too great to be tolerable. On the surface, they are associated with the different definitions, distinctions and models, with the pros and cons of various accounting methods. However, the "invisible" comparability problems are more serious. They include the consequences of extreme non-response rates and systematic errors of all kinds where enterprises seek to make up for a lack of information with estimates and even inventions. And finally they include the uncontrollable risks of errors being potentiated as they are carried forward from one stage to the next. The extrapolation process runs the risk not just of random errors. It is, at best, a rough estimate based on rough estimates and, at worst, on unfounded assumptions. To this extent, any attempts, however well-meant, to estimate on the strength of the existing information on continuing training costs in the sectors not covered by the IW survey in 1993 and in this way to arrive at an estimation for the economy as a whole, are highly questionable (von Bardeleben/Sauter 1995).[8]

Continuing training researchers need to ask themselves where to proceed from here. Statistical surveys are clearly the wrong way. It would be better to ignore the "law of big numbers", which is very deceptive here, and to make an attempt at qualitative analyses based on prototype case studies in enterprises which are willing to cooperate. Of course, these figures cannot be extrapolated. In 1998, BIBB will launch a research project looking at the practical handling of continuing training audits. The aim is to develop guidelines for enterprises wishing to introduce detailed accounts for continuing training. Training auditing is in principle a process-related management tool with a systematized sequence of comparisons between targets and actual performance, starting at the level where continuing training is planned and extending to efforts to ensure the transfer of expertise gained in continuing training to the workplace. To apply this instrument, we must first know the investments in human capital, or in other words, the costs invested in continuing training. The enterprises involved will therefore need not only to implement suitable auditing procedures. They will also need to acquire the knowledge and skills (i.e. the expertise) for keeping track of their business data.

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[8] In addition to the DM 36.5 billion established by IW, agriculture, the liberal professions and voluntary organizations accounted for a further DM 6.7 billion. Spending by local authorities amounted to DM 9.3 billion, that by the Federal Labour Office to DM 21 billion and spending by private individuals (cf. Section 3.3) to DM 9.8 billion. The total of DM 83.3 billion rises by a further DM 36 billion if we place a value on the leisure time lost (!) as a result of individual continuing training.

3. COSTS AND BENEFITS OF INITIAL AND CONTINUING TRAINING FOR THE WORKFORCE IN GERMANY

3.1 Costs and benefits of dual training to apprentices at the first and second thresholds

Due to the expansion in education and training over the past 25 years, an average of about 14 per cent of young west Germans of one age group do not complete vocational training. In 1993, some 38 per cent of 60-year-olds had not completed vocational training. The corresponding figure for 50-year-olds was 23 per cent, for 40-year-olds 15 per cent, and for 30-year-olds 14 per cent (Pfeiffer 1996; Bellmann und Tessaring 1994). This proportion is likely to have fallen slightly in the meantime. If we assume that some 5 per cent of the up-and-coming generation cannot be trained because they lack the talent and/or for behavioural reasons, 14 per cent is a good performance level even by international standards. Experience suggests that the dropout rate is stable and fluctuates within narrow limits. In times of economic difficulties it is higher, and when the economy picks up it is lower. The reasons are, first, that no (formal) requirements exist for admission to in-company vocational training. Second, it is an attractive proposition for youngsters who have grown tired of school, not least because apprentices are now paid around DM 1000 per month, money which those who stay on at school do not have. And third, vocational training provides the basis for a relatively secure career.

Beginning in 1984, BIBB carried out a number of longitudinal studies covering over a period of ten years the occupational destinies of young people who had completed training under the dual system (cf. Schöngen (ed.) 1994, and the literature referred to there). Figs. 4-6 give an idea of their employment situations in the first five years of their working life. The results may be summed up as follows:

- Immediately upon completion of training, approx. 70 per cent work in the occupation they have learned. Approx. 10 per cent work in a different occupation. A further 8 per cent continue their education at school or university. The remaining 12 per cent do not figure among the employed population. They are either looking for work or - the males among them - have been called up to do their military or alternative service.
- Five years after completion of training, the number remaining in the occupation for which they have trained has basically stabilized. Approx. 54 per cent are employed in the occupation they learned, 20 per cent have moved on to other occupations, some 18 per cent are still students. Only around 8 per cent are unemployed.

According to the joint enquiries of the working population carried out approx. every six years (1979, 1985/86, 1991/92) by BIBB and IAB, two thirds of those with completed vocational training surveyed in 1979 said they could use in their jobs "a great deal/rather a lot" of the knowledge and skills they had acquired in training (48 per cent "a great deal" and 19 per cent "rather a lot"). Around 14 per cent answered "some things" and approx. 20 per cent "very little/little/nothing at all". The response pattern remained more or less unchanged up to 1985/86. In 1991/92, however, it changed markedly. The proportion who answered "a great deal" fell by 13 percentage points to 35 per cent, while "quite a lot" was the answer chosen by 23 per cent, 4 percentage points higher than in 1979. The proportion of respondents in these two categories together therefore declined from 66 to 58 per cent. The other figures for 1991/92 were

some things	20 per cent
very little/little/nothing at all	22 per cent

The usability of vocational training declines with growing occupational experience, as shown by polynomial logit models in the ZEW study of 1996 (Pfeiffer 1996). However, this loss of usability and relevance accelerated markedly in the period up to 1992. The major reasons are technological change and particularly the spread of microelectronics, on the one hand, and a growth in retraining and career changes together with escalating unemployment, on the other.

If ultimately only 50 per cent of young people completing training within the dual system remain in the occupation they have learned, this could mean that training the other 50 per cent was a wasted investment or has led to "overeducation". The ZEW figures cited above corroborate this only to a certain extent. As many as 20 per cent of respondents who had completed vocational training said they could use "some things" while only just above one fifth felt their training had been in vain.

This last group is likely to consist, firstly, of young people who have taken up semi-skilled employment. It also includes, secondly, persons who have moved on to higher education after completing their apprenticeships and, thirdly, employees who have been retrained or (temporarily) discontinued their employment for family reasons.[9]

However, there is a reverse side to in-company vocational training for the trainees. The provision of apprenticeship training by enterprises depends on business cycles and growth (Kau 1990). At times of rising employment the demand for trainees grows, and it falls when employment declines. Given that the situation on the labour market has become very strained since 1992 due to redundancies caused by productivity and structural change, not only has the provision of apprenticeship training places fallen. In addition, enterprises are less prepared to retain the apprentices they have trained. This can be seen first and foremost from the number of people who become unemployed after passing their final examination. While 13 per cent of newly qualified skilled workers were jobless in 1991 and 1992, this increased to 18 per cent in 1993, 20 per cent in 1994, 23 per cent in 1995 and is still continuing to rise (Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie (BMBF) 1997). But this figure includes many jobseekers who remain unemployed only for a few months.

For this reason, the average annual unemployment rate for young people below 20 is much lower. In the years from 1990 to 1992, it fluctuated between 4 and 5 per cent, rising to 6.4 per cent in 1993, 7.3 per cent in 1994 and 8.0 per cent in 1995 (Bundesanstalt für Arbeit 1996). However, these figures have to be compared with youth unemployment in other EU Member States.[10] In some Member States, the proportion of jobless young people was several times higher than in Germany. By far the greatest benefit of the dual system is therefore that it reduces the risk of unemployment.

3.2 Vocational qualifications, occupational experience and earnings

In a recent study (Pfeiffer 1996) based on its own random samples from the 1991 microcensus, ZEW looked at the factors influencing individual earnings at the three levels of qualification: no completed vocational training, apprentice training and university degree.[11] The following explanatory factors were incorporated in polynomial logit models and extended "Mincer-type" human capital equations:

- school education and initial vocational training
- technological and economic change
- trade union influence on wages and salaries
- investments in formal continuing training
- occupational experience as an indicator of informal continuing training.

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[9] However, the fact of having internalized basic working virtues during apprentice training is what opens the door to semi-skilled employment in many cases. This is a major positive factor given rising unemployment. For people proceeding to higher education, an apprenticeship can be very useful if they wish to return to their training enterprise at a later date. For anyone who has trained for one occupation, it is relatively easy to retrain for another. The benefit of an apprenticeship in this case is that it saves time. Even young mothers find it easier to return to working life if they have completed apprentice training.

[10] Graph in Tessaring (1997) p. 35.

[11] Cf. also the IAB 1994 study by Bellmann and Tessaring, pp. 13 ff.

Occupational experience had the greatest influence by far in all three earnings equations. Figure 5 (p. 231) shows estimated net earnings as a function of occupational experience in conjunction with the highest vocational qualification. The dependent variable is the net monthly earnings of married men employed in particularly innovative branches of manufacturing trade, with up to 30 years' occupational experience and employment as their main source of income.[12]

Steep initial increases in net earnings give way to flat curves after about 10 years. The reason for this flattening out is falling investment in human capital as retirement draws closer, which leads to a levelling process. The curves were interpreted as follows:

- Initial earnings are lowest for persons with no vocational qualifications. Subsequently net incomes rise steeply as a result of trade union policy, which attached priority to high minimum wages for many years. After about ten years, net incomes in the group without qualifications have risen by about 300 per cent, but remain constant thereafter. Rises in incomes after ten years in employment are subject to narrow constraints since investments in human capital through continuing training are relatively low. This may be attributable to the behaviour of the group of persons in question, or to restricted access.
- The initial earnings of employees with apprentice qualifications lie between the top and bottom groups but are closer to the group with higher qualifications. They are more than 100 per cent higher than the initial earnings of the group without vocational qualifications and double in the space of thirty years. Rises in income are slowest at the initial stage. After about ten years, average incomes are almost identical with those of the group without vocational qualifications. But while the earnings of the latter subsequently stagnate, those of the former group continue to rise up to the 30th year of employment due to better continuing training opportunities. At the end of their working lives, employees who have completed apprenticeship training earn just under 20 per cent more than those without vocational qualifications.
- There is therefore no great difference between the income curves for persons without vocational qualifications and for those with apprentice training. The interval between them is a measure of the difference in lifetime incomes. This finding may be one reason why skilled workers often feel it does not pay to remain in the occupation for which they were trained, which would be a plausible explanation why only 50 per cent choose to do so, as described above.
- The earnings curve for university graduates also flattens out. The curve begins close to the final earnings of the group who have completed apprenticeship training and ultimately rises to two-and-a-half times that amount. The flattening of the curve is less pronounced than for the other groups, so that the earnings gap continues to grow in the latter stages of occupational life.

Formal school qualifications boost the earnings of employees who have not completed vocational training. The same is true to a certain extent for those in the intermediate group: employees who have completed an apprenticeship and also hold intermediate secondary school, specialized upper secondary school or university entrance qualifications earned significantly more than lower secondary school-leavers with apprentice training. On the other hand, there are subject-specific income differences among graduates of specialized colleges of higher education and universities, which can be summed up *cum grano salis* as: Graduates in commercial disciplines are better paid than those in engineering/sciences, and engineering/science graduates better than graduates in arts, culture and education.

The other factors influencing earnings likewise have different effects at the different qualification levels. Trade union influence on wage levels (see above), the impacts of economic growth and of investments in continuing training are greatest in percentage terms in the lowest income group. They still play a significant, though much less pronounced, role for employees who have completed apprenticeship training. As might be expected, trade union influences cease to have any tangible influence on the earnings of the group with the highest qualifications. In contrast to the intermediate and the lowest group, continuing training of graduates evidently does not increase human capital to any appreciable extent. Continuing training for academics serves mainly to maintain the existing level of human capital. It is a reinvestment rather than a net investment in the growth of human capital. There is also a positive correlation between extra earnings in innovative and fast-growing sectors, on the one hand, and the qualification level of employees, on the other. This may be considered a sign that technological change results in a demand for higher qualifications on the employment market.

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[12] Though the results of the study refer to the *Land* of Baden-Württemberg, they differ very little from the figures for western Germany as a whole.

A 1994 IAB study (Bellmann and Tessaring) drew on twelve cross-sectional models of earnings variables, expressed in logarithmic form, for the years from 1976 to 1987. These are of particular interest for our present purposes. Based on the ordinary least squares (OLS) method, two forms of model were employed in each case. The first, known as a schooling model, rests on three explanatory variables: a standardized school and training time variable (S), a variable for occupational experience (B = age S 6) and, due to the concavity of the earnings curve (see above), the square of occupational experience, which serves as a kind of correction factor.

$$\ln Y \quad = \quad b_0 + b_1 S + b_2 B + b_3 B^2 + u$$

The theoretical coefficients b_1 and b_2 are positive, while the non-linear term is negative. The training variable S is specified as follows:

- without qualifications = 10.0 (years)
- university entrance qualifications only (Abitur) = 13.0
- apprenticeship without university entrance qual. = 12.125
- apprenticeship plus university entrance qual. = 15.125
- specialized college of higher education degree = 15.0
- university degree = 18.0

Table 6 (p. 239) gives the coefficient estimates, the correlation coefficient (R^2), the standard error (SE) and the respective sample sizes in 12 regression models. The semi-logarithmic estimate approach has the advantage that the coefficients can be interpreted directly as returns on education and training. According to this approach, the rate of return on each additional school/training year varies between 5.7 and 6.1 per cent, and on each additional year of occupational experience between 1.8 and 2.1 per cent, not counting the negative correction factor. The authors point out (p. 50) that the respective returns on schooling are below previous estimates in some cases and in their vicinity in others (Clement and Weißhuhn 1982; Gerlach 1987).

The problem with these earnings functions is the low correlation coefficient. Given the sizeable sample, the coefficients are of course highly significant. Taking all years together, however, just 32 per cent of the spread in the dependent variables is explained by the aggregate spread in the independent variables. We must ask whether the remaining standard error is really that high and the indeterminable residue really accounts for 68 per cent of the sample, or whether there are not other important determining factors which have been omitted from the model. For this purpose, we would need to take a closer look at the properties of the estimated residues. We might consider distinguishing between vocational fields (trade/technical, commercial/administrative occupations, or industry versus craft trade occupations). Other distinctions could be drawn between slow and fast growing sectors, between urban and rural regions, and between enterprises in different size categories.

The second approach is a dummy variable model in which the earnings variable otherwise remains unchanged. The two magnitudes describing the influence of occupational experience are constant. The S variable is subdivided into five 0-1 variables, depending on the training path (D_1 = apprentice training without university entrance qualifications, D_2 = apprenticeship training with university entrance qualifications, D_3 = university entrance qualifications only, D_4 = specialized college of higher education degree, D_5 = university degree). If the person in question belongs to one of these five groups, the relevant variable is given the dummy value 1 (for "yes") or, if not, the dummy value 0 (for "no").[13] However, it follows from the results given in the IAB study that the introduction of additional explanatory factors (seven compared with three) does not bring any improvements in the R^2 or the standard error over the schooling model, so that the latter is actually preferable for econometric reasons.

The earnings differentials calculated from the dummy variable model are likewise a measure of the returns per additional training year. The added returns of an apprenticeship as compared with no qualifications are put at an average 7.2 per cent. They remained constant between 1976 and 1987, unlike those for academic training paths. The additional returns of a degree obtained from a specialized college of higher education as compared with apprentice training alone rose from 8.5 per cent (1976) to 10.3 per cent (1987). Similar increases were also found for university graduates, although the absolute returns were inexplicably halved compared with those obtained by graduates from specialized colleges of higher education (1976: 3.9 per cent; 1987 4.9 per cent).

The findings from the models therefore illustrate two points. Dual training is a beneficial investment for employees, too. However, the extent of these benefits is falling increasingly short of those obtained from higher education training paths. The earnings of employees with longer training periods rise significantly faster than those of employees with shorter training periods. To this extent, the perspectives of the ZEW and IAB studies are comparable, although the approaches and methods are very different.

3.3 Individual costs and individual benefits of continuing vocational training[14]

In Section 2.2.2 we examined the costs and benefits of continuing training to enterprises. The findings described there should not give the impression that private individuals do not finance any continuing training investments of their own. Individuals in Germany often show an acute interest in their own career development. This is reflected in their spending and above all in the leisure time they devote to continuing training.

The scale of continuing training undertaken by private individuals has been well documented in regular representative statistical surveys carried out every three years since 1979 as part of the Continuing Training Reporting System (Kuwan 1996)[15]. However, information on the money spent and time invested is rather fragmentary. Initial attempts to confront this issue were made in the late seventies and early eighties (Müller/Schradin 1985). To gauge the burden of costs incurred in self-financed continuing training, BIBB asked private individuals about their continuing training expenses for the first time in interviews covering 1992. It goes without saying that benefits are a major motivating factor in this context. The willingness of private individuals to invest money and leisure time ultimately depends on the benefits they expect to reap from their efforts.

The study was based on a definition of continuing training which encompasses courses and seminars both at special training institutions and in-company as well as less formal and purely informal types of continuing training. The latter category includes:

- induction training at the workplace and other in-company programmes designed to promote skills;
- technical school training, distance learning, distance study;
- courses on television and radio, self-organized learning with textbooks, video and audiocassettes;
- attendance at lectures, conferences and trade fairs.

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[13] The equation used to obtain the estimate was $\ln Y = c_0 + c_1 D_1 + \ldots + c_5 D_5 + c_6 B + c_7 B^2 + v$

[14] Cf. for the following: von Bardeleben et al 1996

[15] The report contains a complete review of all six surveys conducted since 1979.

There are numerous ways in which expenses may be refunded for training outside the workplace (refunding), e.g. by employers and employment offices. These refunds are deducted from individual expenses in the costs model (cf. Figure 6, p. 232). The survey aimed, first, to establish the direct costs, i.e. expenses directly associated with the continuing training measure as such (course and event fees, spending on learning materials, travelling expenses, board and lodging, cost of child care where applicable, and all other costs directly associated with participation in continuing training programmes). The survey also looked at indirect, or opportunity, costs. Unlike direct costs, indirect costs entail no expenses, but arise in the form of lost earnings (e.g. unpaid leave or reduced working hours for continuing training purposes, but not the hypothetical earnings of someone who was previously unemployed) and the loss of leisure time. The leisure time lost consists of that time spent exploring the market, the time invested in the actual training programme, travelling time, preparation and follow-up and, in some cases, paid leave.

However, the yardsticks used to convert the loss of leisure time into fictitious costs are ultimately based entirely on random decisions. Even the net income earned from employment, which would be a plausible choice, does not provide a suitable measure here. Either the individual may not consider taking paid employment during leisure time - unless it is moonlighting - or may regard it as a consumer good rather than a loss of leisure time. For this reason, the BIBB survey was limited to recording the amount of leisure time lost and no attempt was made to place a monetary value on it.

Neither was it possible to apply any rules for evaluating the benefits. While it is quite clear that the "profitability" of continuing training is determined by the benefits, the input encompasses not only the time and money invested, but also the physical and mental exertion associated with learning. Private individuals, just like companies, are willing to subject themselves to continuing training only if it yields overall "rewards". But these rewards depend on whether the training is a consumer good and the benefits are to be found in actual consumption, or whether it has been chosen for career, i.e. economic, reasons.

Economic benefits may arise in many different ways: continuing training may serve to refresh knowledge, to adjust to new developments, to secure promotion and raise status, or else to avoid unemployment. Another consideration is that the benefits are normally not yet visible at the actual time of training. Those who opt for continuing training *hope* it will secure them promotion or save them from unemployment. Whether these objectives are actually attained emerges at a later stage. It is therefore objectively impossible to isolate the economic benefits of continuing training from other benefit factors. For this reason the survey was limited to presenting the respondents with a list of benefits and asking them to rate their importance in qualitative terms.

In 1992, the employees questioned spent an average of 225 hours outside working time on their personal continuing training. There were huge differences between individual inputs, as might be expected. In western Germany, just over 22 per cent of the sample polled invested more than the average of 225 hours, compared with approx. 50 per cent in eastern Germany. Figure 7 (p. 233) provides an overview of the estimated costs. The average costs per capita were DM 1427 in the west and DM 1928 in the east. After deducting the refunded expenses, the individual financial burden of continuing training was DM 1053 and DM 848, respectively. If we extrapolate these figures for Germany as a whole, this produces an estimated total of DM 9.8 billion, including DM 7.7 for western Germany and DM 2.1 billion for eastern Germany. Figs. 11 and 12 look at how the sample in the survey assessed the benefits and how far they believed they had attained their objectives.

4. PRIORITIES OF TRAINING COST AND BENEFITS RESEARCH IN OTHER COUNTRIES

4.1 Preliminary remarks

In-company training is essentially the main alternative to school training. In countries with a shortage of skilled labour, the ideal solution would often be to intensify in-company training. At least, this would make it easier to bring the results of training processes into line with the qualifications required by enterprises. However, enterprises are often deterred by the (perceived) costs. An obvious consequence, particularly in countries with a tradition of school-based training, would be to analyse the costs and benefits to enterprises. Paradoxically, this practice is rare. Interest focuses on the benefits accruing to holders of qualifications. It would go beyond the scope of the present study to examine each EU Member State separately. The objective must be to take specific examples and to describe how these countries approach cost and benefit analyses.

While German cost-benefit research attaches major importance to the results obtained from representative empirical surveys of enterprises and private individuals, other EU Member States concentrate more on modelling the monetary benefits for the holders of qualifications and, building on these, on (econometric) estimates of the returns on training investments.

This different perspective is, of course, associated with the institutions which dominate the education and training systems in these countries. They are rooted in tradition and culture, and embody structures which have developed in the course of history. Enterprise-based training systems in which state-recognized occupations are trained throughout the country exist only in Germany and Austria and, to a lesser degree, in Denmark and the Netherlands. Having largely ignored the vocational training of its labour force for many years and considered the teaching of skills outside the higher education system a training responsibility for employers, since 1986 the United Kingdom has switched on a grand scale to a modular training system in which the module contents make no distinction between different addressees or between initial and continuing training.

France operates a more or less rudimentary apprenticeship training system where trainees learn basic vocational skills in an extension of semiskilling, and a system of vocational schools (lycées). Initial and continuing training are financed through a stringently regulated system. School-based training systems are dominant in the other Latin countries, notably Italy. The previous distinctions between school-based training, occupational work and continuing training are becoming increasingly blurred in Spain.

If we are to illustrate the cost and benefit issues of initial and continuing training in the EU Member States and the relevant research requirements in a manner which is accessible to outsiders, we would really have to begin by describing the national institutions. But this would go beyond the terms of reference of this study. Furthermore, it is very difficult for people from other countries to appreciate the significance of national institutions and approaches without direct exposure to them. The points made below concentrate on what is realistically possible, looking at current issues confronting each of the selected Member States, taking up interesting approaches to research, new methods and models with a view to revealing certain prototypes.

4.2 Austria[16]

The basic features of the Austrian training system are similar to that in Germany. However, there are marked differences in young people's educational patterns. While approx. two thirds of the relevant age cohorts, including many with university entrance qualifications, undergo training under the dual system in Germany, the proportion in Austria is approx. 45 per cent. Apprenticeships are mainly a means of training young people with basic school-leaving qualifications. The intermediate and higher vocational school system is far more widespread than in Germany, both in technical and trade occupations and in the commercial field.

In recent years, two surveys of costs (for 1990 and 1995) incurred in in-company training were performed along similar lines to the German cost model. The following points refer to the 1995 survey. Like the full and partial costing methods, the latest Austrian model distinguishes between gross costs Type I and Type II. Type I is identical with the German full costing method, while Type

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[16] Cf. for the following discussion: Stepan, Ortner and Oswald 1994; Lassnigg and Steiner 1996, pp. 22 ff.

II concentrates more on marginal costs than the German partial costing method, which encompasses the cost elements relevant to decision-making. However, the difference between this and the partial costing method is minimal.

Gross costs, Type I:

- labour costs (remuneration, voluntary social contributions, other payments to apprentices)
- material costs per apprentice
- costs of full-time trainers
- costs of part-time trainers
- costs of capital goods
- administrative costs

The gross costs, Type II, arising when an additional apprentice is engaged, comprise the first three items. It is instructive to compare costs between the two countries (using the GDP deflator to adjust them to 1991 prices and converting them to Austrian schillings). In Germany, the personnel costs for apprentices are more than 10 per cent lower than in Austria. All other costs, however, are two to three times higher. In total, German costs established according to the full costing method are 31 per cent higher than Austrian gross costs, Type I.

Unlike the German net costs model, the returns side involves two modes of calculation, substitution returns and equivalence returns:

- The substitution returns are based on the extra work input which would be required if no apprentices were available. The full-time equivalents are calculated for two categories of employees, unskilled/semiskilled and skilled workers, and multiplied by the respective wages and salaries.
- The equivalence returns accord with the German returns model. The apprentices' productive working time, subdivided according to ancillary and skilled work, is multiplied by a performance factor, and the product obtained by the wages for ancillary and skilled workers. The performance factor for ancillary work remains constant at 100 per cent, while that for skilled work depends on the year of training.

There is a very low correlation between the two types of returns (r = 0.23), leaving considerable room for doubt about the usefulness of the terms employed. The substitution returns are almost 25 per cent higher than the equivalence returns on average, and this although, for lack of information, the substitution returns were assumed to be zero for many enterprises. It may be that a large number of respondents misunderstood the substitution concept. This would make the equivalence returns a more valid measure.

The Austrian equivalence returns are almost 20 per cent higher than those in Germany (after adjustment for deflation and conversion to Austrian schillings). Balancing the costs according to the full costing method (Germany) and the gross costs, Type I (Austria), against the equivalence returns leaves German net costs of 144 000 Austrian schillings compared with approx. 68 000 Austrian schillings in Austria, a difference of 113 per cent.

Austrian society considers apprenticeships much less prestigious and of markedly lower status than qualifications from an intermediate, let alone a higher, vocational school. Strata-specific unemployment risks indicate that Austrian enterprises, too, value employees with school/university training higher than those who have completed apprenticeships. The labour market statistics are highly indicative in this context. The overall unemployment rate as of mid-1997 was 5.8 per cent. The risk of becoming unemployed for those with only compulsory schooling and no vocational qualifications was just less than 10 per cent. This compares with a little over 5 per cent for those who had completed an apprenticeship, 4.2 per cent and 3.6 per cent, respectively, for holders of qualifications from intermediate and higher vocational schools, and 2.8 per cent for university graduates .[17]

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[17] *AMS, Arbeitsmarkt & Bildung in Österreich*, Vienna, August 1997, pp. 2 ff.

4.3 United Kingdom

Upon completion of compulsory schooling in the United Kingdom, school-leavers can choose between certificates under the National Vocational Qualification (NVQ) system and General National Vocational Qualifications (GNVQs) obtained exclusively through school-based training at Colleges for Further Education. The qualification levels at these colleges are equivalent to NVQ levels 1 to 3. The following remarks refer solely to the NVQ system, which is much more differentiated and of greater quantitative significance. The NVQs (SVQs in Scotland) introduced by the British government in 1986 are a modular system of vocational qualifications valid throughout the country (Reuling 1996, 1997, in preparation; Richter 1996). Vocational training under the German dual system ranks on a par with NVQ level 3, tending towards level 4. Levels 1 and 2, which account for the bulk of trainees in the United Kingdom, do not exist in Germany.

The certification of knowledge and skills obtained in formal learning processes and by way of work experience is the means chosen for not only for the initial training of young people but also for the training of (employed and unemployed) adults. The NVQ system thus draws no distinction between initial and continuing training. The background to this reform was a training system which, prior to 1986, had been inadequately geared to the needs of the market, was excessively complex and ridden with inconsistencies. Besides, only a small proportion of the British workforce had any vocational training at all. Even today, just one in two employees in the labour force as a whole holds a recognized qualification. This compares with just above two thirds of 19-year-olds. Apart from the NVQ system, the traditional semi-skilled vocational qualifications have been retained, as of course has university and polytechnic-level training (Department for Education and Employment 1996; Steedman, Mason and Wagner 1991).

The NVQ system is based on a framework of functional elements covering the entire employment system, which is subdivided horizontally into a large number of job areas (currently 794) and vertically into five degrees of difficulty from the least (level 1) to the most demanding (level 5). The functional elements are packaged in modules in response to the requirements of the labour market. Level 3 in this system more or less corresponds with the level of training of the German dual system.

The core of the NVQ system is a decentralized certification procedure. A distinction is drawn between qualifications, a collective term with a standardizing effect between different disciplines, and modules, a system element. Qualifications in the British sense are therefore not comparable with Germany's training occupations. In formal terms, every qualification is a cluster consisting of a defined number of modules which are in demand on the labour market and therefore have a market value. Unlike German training ordinances, NVQs provide for the examination and certification not of learning objectives but of the results of these objectives, or the competencies required by employers. The examination, which is the responsibility of "accredited" training providers, determines whether or not the candidate is competent, or able to act in a work situation.

The measurement requires a system of performance criteria and examination guidelines. Given this approach to vocational training, it is unimportant, at least in principle, how the knowledge and skills are taught, at what learning sites and over what period they are obtained and accumulated.

The value and benefits of the NVQs to employers and their holders crucially depend on whether there are any reliable indicators to ensure examination standards are comparable throughout the country. After all, enterprises examine their own employees. Indicators are, of course, substitute variables for facts (in this case: competence) which cannot be observed directly. Experience to date suggests that the system tends to atomize the indicators. This makes the examination system complex and costly, so that small and medium-sized enterprises hardly resort to NVQs.

Since they are a very recent introduction, it is by no means easy for NVQs and GNVQs to gain public acceptance in Britain (Geb 1997). Euphoric verdicts by employers and reports of success from holders notwithstanding, the response in the press has been cautious to critical. A typical argument is that all aspiring trainees should definitely ask themselves three questions: What training opportunities exist? What do I want to do afterwards? How credible is the system to employers or when applying for admission to university? These questions in particular indicate that the benefits of the system to people in employment have yet to be proven conclusively (Sloane, Battu and Seaman1997).[18]

The decentralization immanent to the NVQ system and the abolition of most of the former industrial training boards, which fell victim to deregulation, have made it more difficult to find reliable data on corporate training budgets. As in Germany and Austria, the only solution is to question specific enterprises. A number of surveys have been carried out in the past few years, by IFF Research in 1993 (IFF Research 1996) and by the Industrial Society in 1994 and 1996 (Industrial Society 1996). While the IFF study looked at spending on training by employers as a whole, the Industrial Society carried out a representative survey of its affiliates. The results of the latter survey are summarized below.

In 1996, approx. 400 companies from a random sample of just under 3800 responded to a questionnaire from the Industrial Society. Average spending on initial and continuing training amounted to 521 ECU. The average in the manufacturing trade was 572 ECU, and in the service sector 399 ECU. This represented a slight rise in overall spending compared with the previous survey in 1994, although it had fallen in per capita terms. The apparently contradictory finding, according to the Industrial Society, is due to the more economic use of enterprise training budgets. This has been achieved, the Industrial Society claims, by cutting administrative costs and introducing more advanced training methods. Information technology resources in particular had improved the results of enterprise training.

The study also reveals that the employers polled are in the process of concentrating their training efforts on their "more productive" workers and that part-time and temporary employees in particular have an increasingly remote chance of being included in further training programmes. The Confederation of British Industry has issued an explicit warning to its members about the consequences of this policy, which it believes will lead to the devaluation of human capital among an important contingent of the labour force.

Unlike the Industrial Society, the IFF distinguishes in its study between enterprises in different sectors and of different sizes. This revealed that not only all big companies but also nearly all medium-sized and even a large proportion of small enterprises had offered initial and further training in one form or another. Most companies, it is true, concentrated on on-the-job training. Many also took advantage of the opportunities for open learning. Open learning is a term used to describe training outside the workplace which is not organized by the enterprise, but where trainees, supported by their employer, choose their own learning environment (e.g. evening classes, distance learning, learning software). Open learning is more popular in larger enterprises. It is a method favoured by some 90 per cent of big companies (more than 2500 employees), 60 per cent of medium-sized and 20 per cent of small enterprises. The study also revealed that one in two employees had attended further training for an average of four days per year.

Further training costs are broken down as follows:

- costs of wages for participants
- fees for trainers
- costs of training centres
- administrative costs
- costs of equipment and materials
- travelling expenses and meals
- training fees minus subsidies.

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[18] Cf. also Section 4.7 below.

This list is limited to items in the gross costs account. The survey clearly did not ask about the returns from on-the-job training or saved opportunity costs which may arise after completion of training. Given the takeoffs induced by the NVQ system, returns as a means of cutting the cost of enterprise training are likely to become an increasingly prominent issue in British training research.[19]

Extrapolating the results of the survey for the UK as a whole, we obtain overall spending on training of 15 billion ECU. Of this total, 11 billion ECU were spent on further training outside the workplace. The costs of trainers and administration accounted for 14 per cent of the total, and continued payment of wages during training time for approx. 33 per cent. If we divide the total by the total number of persons employed throughout the UK, this produces estimated per capita spending of 830 ECU per annum. Surprisingly, per capita spending by bigger companies (500 or more employees), at 700 ECU, was well below that by smaller companies. Small enterprises spent an average of 1050 ECU per capita, compared with 770 ECU for companies with 200 to 499 employees.

4.4 France[20]

Initial training in France centres not on enterprises but on schools (lycées), leading to the vocational or technical version of the *baccalauréat*. A form of apprenticeship training does exist on a modest scale, combining enterprise training with school instruction at a *Centre de Formation des Apprentis*. The French government has made occasional attempts to introduce a dual system modelled on the German pattern.[21] But these efforts never met with success. On the one hand, employers resisted moves to shift the burden of costs onto their shoulders and, on the other, an apprenticeship does not enjoy sufficiently high status among school-leavers. For these reasons, cost and benefit issues of in-company initial training do not arise in France.

There are now three forms of vocational baccalauréat. The oldest, the CAP, is geared to specific occupations. A second version (BEP), introduced in 1970, seeks particularly to encourage the spread of basic vocational training, while the academically more demanding *Bac Pro* was introduced in 1985 to give vocational training an higher social status. Vocational school attendance varies between two and four years, depending on the subject.

The French vocational training system is centrally controlled. It is financed through a system without parallel in the EU. All private enterprises with more than ten employees pay a training levy currently amounting to 1.5 per cent of their annual wage and salary bill. This total was calculated, in theory at least, to allow 0.9 percentage points for continuing training of the staff, 0.4 percentage points for induction training and reintegration, and 0.2 percentage points for training leave to which employees are entitled by law. The training levy paid by enterprises with ten or fewer employees amounts to 0.15 per cent. The focus of these provisions then is on continuing vocational training. In addition to this, an apprentice tax of 0.5 per cent of the gross wage bill is paid by all employers in industry, commerce and the craft trades. Actual spending on training by French enterprises is higher than that stipulated by law. In 1993, the last year for which figures are available, it stood at 3.5 per cent of gross wages and salaries (Jeger 1997).

Companies are required to provide proof of their training expenditure. Eligible spending includes not only the costs of training their own employees, but also the costs of plant and equipment supplied to other vocational training institutions. If actual expenditure is below that stipulated by law, the balance must be paid into a central vocational training fund.

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[19] Cf. survey carried out on behalf of the European Commission: *The economic dimension …, 1996*, p. 26, and the empirical studies cited there. The EC report refers, among other things, to a comparison of costs between the United Kingdom and Norway done by P. Elias et al.: "Vocational education and training in Britain and Norway". In: L. M. Lynch (ed.), *Training in the Private Sector. International Comparisons*, Chicago 1994. The returns from apprentice and semi-skilled training in the UK were much higher than those in the Norwegian school-based training system.

[20] Department for Education and Employment 1996, pp. 68 ff.

[21] Most recently Edith Cresson, Prime Minister at the time.

In terms of participation in continuing training, this financing system has produced the results which the French parliament sought to achieve. A labour force survey by the National Statistical Board (INSEE) provided individual information not only on the education, employment and continuing training of each employee but also on their place of work. A comparison of the 1993 results with those for 1989 revealed the following (Goux and Maurin 1997). Approx. 25 per cent of those polled in 1993 said they had taken part in continuing training programmes between 1989 and 1993. This compares with just under 11 per cent in the years from 1973 to 1977.

The INSEE study further sought to establish whether differences in enterprises' continuing training activities also result in different wages and salaries. The findings were very instructive: if the earnings effect of training is estimated according to a Mincer-type[22] ordinary least squares model, a technique commonly applied on an international level, the rate of return calculated from the enterprise continuing training coefficient is 4.5 per cent. The authors of the study concluded that the model's assumption of causality between continuing training and higher wages did not bear up to scrutiny. The wage differences between people who underwent continuing training and those who did not could be divided into two groups. One consisted of differences arising from the fact that companies which actively pursue continuing training are those which pay higher wages. The second was associated with employees' "trainability". Companies tended to offer continuing training mainly to their better paid employees, believing the success rate to be higher with them. The causality was therefore not from right to left, as assumed in the equation, but from left to right. Having incorporated their own findings in an extended model, the authors concluded that the real return on continuing training, i.e. higher incomes causally attributable to prior continuing training, was (virtually) zero.

Moreover, continuing training received in other enterprises between 1989 and 1993 did not produce any wage increments in the current job. Changing employers was therefore not a profitable proposition for employees with a continuing training record. Since in-company continuing training had no significant influence on the wages paid by the enterprise offering the training, its main purpose was to raise employees' loyalty. The likely explanation is that enterprises seek to ensure their spending on continuing training is an investment in specific human capital (as defined by Becker), which has no utility value elsewhere. The difference between the higher performance of those with continuing training and the unchanged wages they receive is the enterprise's return on its investment in human capital.

4.5 Spain

Spain's school-based training tradition incorporates various levels from no schooling to primary education, secondary education, basic and higher vocational training (levels 1 and 2), training at specialized colleges of higher education (*escuela universitaria*) and universities. For some years, this system has been "fraying at the seams". The traditional training path of school-leaving qualifications (possibly) with supplementary specialized training in schools/courses, followed by the start of employment and occupational experience and eventually continuing training, retraining and upgrading training for promotion purposes is breaking down as previously distinct stages merge. The dividing line between initial and continuing training is becoming increasingly blurred, and alternating stages are now becoming more and more common. Some young people take part in work experience programmes while still at school. In later years, too, there are school pupils who also work and employees who also attend school. This boils down to a "spontaneous", i.e. uncontrolled, dualization of education and training processes.

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[22] The model was: $\ln w_{i,1993} = X_{i,1989}b + Z_i c + u_i$. i stands for the individual, lnw the natural logarithm of the hourly wage, X for the matrix of personal features and Z the (O, 1) dummy variable for continuing training received between 1989 and 1993 in the enterprise where the individual was still employed in 1993. Continuing training in other enterprises is not included here.

The trend towards complex training patterns which do not follow any systematic design is vividly illustrated by a retrospective longitudinal study of youth and young adults (up to 31 years of age) carried out in and around Barcelona in 1991 (Planas 1996). The main purpose of the study was to structure the training processes found according to different career paths. This classification reflects a polarization of career development routes resulting from the selection mechanisms and the precedents set at school. Spanish people with extensive school education are the group most likely to take part in continuing training, and those with no school qualifications are the least likely to do so. The respondents were asked how useful training had been in advancing their careers. No attempt was made to estimate the returns on the investment in human capital, but the benefits were assessed in qualitative terms.

The career path analyses showed that the sample polled fall into three main groups labelled A to C and each incorporating several subgroups:

- The salient feature of Group A (22 per cent of the sample) is that they dropped out of school or have the lowest level of training. Their initial earnings are in the low to middle range. Their employment patterns reveal no changes, or follow a static course, interrupted by prolonged periods of unemployment. There is a pronounced desire for alternative employment or a different occupation.
- Group B (22 per cent) comprises people who have completed compulsory schooling or have equivalent vocational qualifications (= first level of vocational training), some including more advanced courses. Initial earnings are in the middle to low range and employment patterns either static or frequently changing, but without conspicuous periods of unemployment. Here, too, there is a widespread desire for better work or a different occupation.
- Group C (24 per cent) comprises holders of university entrance qualifications without university degrees who may have completed short courses of higher education, and people with higher (level 2) vocational training. Most of the respondents in this group had taken a number of continuing training courses, and some had several years' occupational experience. Their initial earnings are mostly in the middle, and sometimes in the higher range. The subsequent career fortunes of most of this group show an upward trend. They are not normally interested in alternative employment or a different occupation.

These different training and employment patterns suggest the hypothesis that earnings differentials and differences in lifetime incomes are the consequence of a stringently segmented labour market. The first labour market is made up of "good jobs" with higher pay for the human capital supplied, good working conditions and a low unemployment risk (Peralta and Sánchez 1997). The second labour market is dominated by "bad jobs" (low income, poor working conditions, instability). The processes determining wages are therefore very different from one market to the other. Roig and Moreno tested this hypothesis against biographical data for 2265 Spanish employees outside the agricultural sector. The sample had been weighted previously to compensate for strata-specific overrepresentation.[23]

The problems of drawing empirical distinctions between submarkets have long been familiar, so we do not need to expand on them here. There have been numerous attempts in the international literature to find empirical solutions to the segmentation of the labour market. All of them were unsatisfactory to a greater or lesser extent. Even cluster analysis, which would seem to be a particularly promising approach, failed to find objectively sustainable dividing lines between the submarkets. This led Roig and Moreno (1997) to select a switching approach which dispenses with explicit a priori segmentation. Employees are allocated to one of the two submarkets implicitly be means of latent (unobservable) switching variables. This allocation is rather an endogenous consequence of the estimation process.[24]

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[23] A similar switching approach to the analysis of mismatch problems in the Spanish labour market is taken by Beneito, Ferri et al. (1997). On mismatch problems cf. also Section 4.7 below.

The estimates obtained are compatible with the duality hypothesis for the Spanish labour market. The fact of belonging to one of the two segments is not a random product. Individual features, especially those which have a bearing on human capital and productivity, determine the "ease" of access to the first labour market and thus also wage levels and lifetime earnings.

Lassibille (1997) chose a similar method in terms of the questions it implies to explain wage differences by gender and private-public sector distinctions.[25] The problem here, too, is one of drawing clear dividing lines (a selectivity bias). The approach is based on an essay by Heckman (1979) in which the author showed that a sample selection bias is synonymous with a model specification error. The explicit variables, in a manner of speaking, take up the influences of the missing variables, so that their coefficients are distorted.

The sectoral earnings functions are - as usual - of the Mincer type. However, before the coefficients are estimated, correction factors are established as a measure of the probabilities of sectoral choices by the individuals in the sample. These are subsequently incorporated in the earnings determination equations as additional explanatory variables alongside the training-specific variables. According to this approach, the individuals have a choice between no employment, employment in the public sector, employment in the private sector and self-employment. Table 7 (p. 240) shows the ultimate added returns on human capital investments as a percentage.

The differences in the estimated returns are extremely high in some cases. Basic vocational training (level 1) for women is claimed to produce added returns of 2.9 per cent in the public sector and 35 per cent in the private sector, while the correlation coefficients of the earnings functions are just 0.34 and 0.19 (!), respectively. It is difficult for anyone who is not familiar with Spain to gauge whether these estimates are plausible. The suspicion that they are not is supported to a certain extent by another study (San Martin Lizzaralde 1997).[26] This showed that a statistically established connection between education and earnings exists only after completion of secondary education (12 years or more). For people below this level the return on training is virtually zero. After completion of secondary level education, each additional year of education and training yields a return of 6.7 per cent.

4.6 Netherlands

Two training systems exist side by side in the Netherlands, a full-time school system with two to four-year courses (MBO = *Middelbaar Beroepsonderwijs*) and a dual apprenticeship training system (*Leerlingswezen*) very similar to the German model with one to three-year training in enterprises and part-time vocational schools. Until recently each of these systems had its own training programmes. Attempts have been made of late to standardize at least the learning objectives, albeit within the context of the two systems. These moves are based on a new

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[24] The Roig/Moreno model is based on three equations, one each for the coefficient function of the earnings levels, expressed as logarithms, in segments 1 and 2. The explanatory variables, which are identical in both segments, stand for personal features such as gender, marital status, education, indicators of over-, under- or matching education for the respective job, etc. They are a measure of the ability of the employed to gain a foothold in the first labour market or of them being forced to accept the bad jobs in the second labour market. A third function (switching equation) serves to identify the latent switching variable (y_n) in whiich the tendency of the nth individual to be placed in the first labour market is expressed by a positive y value, and a tendency to be placed in the second labour by a negative y value. All coefficients are estimated simuntanously using maximum likelihood methods. The y estimates are positive for the various stage-based training variables, i.e. they tend significantly towards the first labour market. The y estimates are negative for the variable "female", the square of occupational experience and the frequency of job changes. The problem with this approach, however, is that the statistics supporting almost all explanatory variables in the function for the second labour market are either inadequate or non-existent.

[25] Cf. also Garen 1984

[26] The equation used was $\ln W = a_0 + b_1 S + b_2 X + b_3 X^2 + b_4 Z + u$. S stands for the year of schooling dummies (S = 1,..., >17), X for cumulative occupational experience, and Z for the remaining regressors. The estimated correlation coefficient is 0.46 for a sample of 1994 people.

Vocational Training Act (v. Lieshout 1997, Reuling 1991). Unlike the German system centring on qualifications in recognized training occupations, which makes no distinctions between training levels except for stage-based training in a small number of occupations, the Dutch system incorporates four different levels of training: ancillary worker training, basic training, skilled worker training, and expert or middle management training.

The parallel existence of school-based and dual training systems raises a number of regulatory problems. Instead of providing initial training themselves, enterprises can recruit employees with MBO qualifications, which are based on learning objectives representing minimum standards (as in Germany), and provide them with continuing training in accordance with specific enterprise requirements. This would make it easy for companies to place the burden of costs on other shoulders. It is a priority of Dutch vocational training policy to prevent such undesirable developments. Research interest therefore focuses not on isolated comparisons of returns from specific types of education and training, but on the economic benefits of complete educational routes in general education and initial vocational training. The OSA-Report published in 1994 is indicative of these priorities.[27]

Information on the costs of the Dutch training system is sparse. The total costs of in-house and external training by enterprises are known to have been NLG 3 billion in 1990. It is also known that the labour market administration costs for the apprentice system add up to some NLG 260 million per annum. However, no details are available on associated spending by enterprises. The OSA-Report[28] suggests it is likely to be higher than public subsidies.

Analyses of returns on human capital investments distinguish between individual and social, or macroeconomic, returns. The individual benefits of an additional qualification is the discounted difference between expected and current income. The higher earnings are expected to be in future and the lower they were in the past, the greater the willingness of individuals to invest in their human capital, and vice versa (Nelissen and Stancanelli 1997). The overall social returns are calculated by aggregating costs and benefits for all groups in society (individuals, enterprises, the state).

In its estimation of returns on education and training, the OSA-Report assumes firmly established patterns of regular initial training and does not consider subsequent continuing training. The return is a measure of the added benefits obtained by tagging on a further stage to the established route. For example, the added net return from full-time schooling or dual training (MBO) is estimated with reference to the vocational preparation stage (VBO). The return estimates are then assessed. A return below 2 per cent is considered unattractive, so that additional investments in the training level in question are to be avoided. Rates of return of three per cent are normal, while higher rates point to profitable investments in human capital.

The OSA-Report distinguishes between approx. 35 different educational paths, considering technical, commercial and social care disciplines. The estimates of individual net returns range from -4 per cent to 8 per cent; estimated social returns from -4 per cent to 6 per cent. For example, the MAVO -> MBO route (junior general secondary education -> full-time school or dual training) has proven to be unprofitable. The added return for women is in the region of 1 per cent, and for men it is negative. The MAVO -> HAVO route, that to senior general education, performs much better, yielding returns of 4 per cent for men, 7 per cent for women and 5 per cent for society as a whole. However, MBO training is worthwhile personally and generally (returns of 3, 6 and 5 per cent, respectively) for holders of an LBO (lower vocational education) certificate.[29]

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[27] Organisatie voor Strategisch Arbeidsmarktonderzoek (OSA). The report states: "For the government it is important that the costs for education stay in line with the benefits. The expected rate of return is therefore taken into consideration when decisions are made about investments."

[28] OSA-Report, loc cit., p. 1.

4.7 A look at outstanding issues and conclusions

The Maastricht Conference of the Applied Econometrics Association (AEA) produced a large number of papers on the economics of education and training in the context of the issues confronting knowledge-based societies. It seems reasonable to assume that the extensive body of material presented at that conference is a representative cross-section particularly of research outside Germany. It is neither possible nor necessary to present lengthy reviews of specific papers beyond those addressed above. A brief description of the main issues will have to suffice.

Most studies presented at the AEA conference are based on the following premisses:

- Private rates of return are higher than social rates of return: negative repercussions of the expansion in education and training (retraining, social transfers) are borne by the general public. Infrastructure investments in the education system are mostly financed by the state, but the benefits from the use of this infrastructure accrue to individuals.
- Rates of return fall as the level of education and training rises. The returns on higher education are, as a rule, lower than the returns on higher secondary education.
- Due to the allocative effects of the labour market, the returns on education and training depend in the longer term on movements in the supply and demand situation for specific qualifications.
- Rates of return fall as a country becomes more developed.

Research often focuses on estimating returns according to the Mincer approach, which is extended, refined or modified in some other way depending on the requirements of the country from which the data was obtained. Particular attention has been given to models addressing the individual benefits of investment in human capital and - on a more specific note - the negative effects of imbalances between the supply of and demand for qualifications. Prolonged shortages of jobs increase the readiness of the up-and-coming generation to train for higher qualifications, invariably leading to mismatches in the form of general overeducation. Market forces do not tend to produce a balance here. The longer a shortage of jobs persists, the more people are prepared to accept work below their qualifications. This in turn leads to frequent job changes without anything bring done to correct the mismatch.[30]

Sloane, Battu and Seaman drew on a large body of data to examine the effects of overeducation on the earnings, career success and mobility of British skilled workers. They concluded that overeducation is not necessarily a waste of effort for the employees concerned. However, the earnings benefits were lower than those obtained from qualifications which match the job held.[31]

Two works deal with issues of mismatches in the Netherlands. The first is mainly empirical, while the second has a methodological/theoretical bias. In 1995, Borghans and Smits investigated the consequences of overeducation for people with higher vocational education (HVE) employed in positions which underutilize their specialized knowledge.[32] The analysis drew on data from the Netherlands HVE Monitor in which 30 000 HVE graduates from 1994 provided information about their occupational experience one and a half years later. This indicates that HVE graduates who began working life in positions below their qualification levels earn less than those who found jobs commensurate with their training.

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[29] Odink, Gelderblom, de Koning and van Winden (1997) criticize about traditional mincer models that (alluding to Gertrude Stein's famous saying, "a year is a year is a year") all education and training years are weighted equally. The same level of education, they object, can be attained in various ways. Then there is the impact of continuing training, which itself depends on the previous level of education. And finally, repeated classes and instances dropping out from school need to be considered separately. This study, too, is based on the OSA Panel.

[30] Cf. G. Forgeot, J. Gautié: *Insertion professionelle des jeunes et processes de déclassement*. The authors calculated overdeucation indicators for France and used them as a tool to study mismatch processes between 1986 and 1995.
A good overview of the mismatch literature is provided by J. Hartog, *On Returns to Education. wandering along the Hills of ORU Land*. ORU is an abbreviation for over-, required, undereducation. The adaptation of the Mincer earnings function in its generalization is: $\text{Ln } W = XB + c_1 \text{ OVER} + c_2 \text{ REQ} + c_3 \text{ UNDER} + u$. Here, too, Ln W, are the wages/salaries expressed in logarithmic form, and the data matrix X contains the human-specific explanatory variables.

[31] P.J. Sloane, H. Battu, P.T.Seaman: *Overeducation, Undereducation and the British Labour Market.*

However, mismatches occur not only in levels but also in subjects. Here, too, the employees affected earn less, but the loss of income is not as great as that resulting from overeducation. When the number of graduates seeking employment exceeds the supply of suitable jobs, there is not only a growing willingness to accept work below one's qualifications. Even those graduates who find suitable employment suffer considerable losses of income.

Van Eijs and Heijke developed a model linking the suboptimum allocation of skilled manpower with gaps in the transparency of the labour market.[33] They sought to attain two objectives: first, to develop a theoretical model which reveals and demonstrates by empirical means the implications of mismatches for the economics of education and training, and second, to estimate and assess the losses of human capital resulting from misallocation. These losses occur through increased induction costs to compensate for gaps in skills.

Apart from papers assessing the returns of education and training investments for people in employment, some of the studies presented at the Maastricht Conference are of major methodological interest. Belzil and Hansen drew on Swedish individual data to develop a non-stationary dynamic programming model (with backward-recursive equations) to examine the theoretical implications of the choice between continued schooling and employment. The duration of schooling is no longer an exogenous variable, as in the simple Mincer-type models, but is determined endogenously in the equation system.[34]

Ballot et al.[35] chose an intriguing model application. The authors applied the macroeconomic theory of endogenous growth to corporate growth. They carried out a comparative analysis applying Cobb-Douglas production functions to data on Swedish and French companies. According to this model, human capital has a direct impact on gross added value, whether due to high workforce productivity, more innovative decisions or better work organization. R&D spending (= technological capital) is a source of innovation and added value. It follows from this approach that corporate growth results from the growth of human and technological capital. Apart from these direct effects, indirect effects result from the additional endogenous growth factors unleashed from a certain level of intangible capital assets. The more human capital there is in a company and the greater its technological expertise at the same time, the easier it is to achieve learning by doing and ensure transfer of knowledge among its own employees, reducing the need for investment in formal training.

5. CONCLUSIONS

Readers will have noted that many studies from non-German-speaking countries rest on the benefits of human capital and training to people in employment. There are a large number of essays addressing this theme, but the results are hardly comparable due to the different methodologies applied and the different ways in which the estimates were obtained. Even in countries with a comparable level of development, the estimates are so varied that this fact alone is bound to raise doubts. We would contend that a satisfactory answer to how high the individual returns of education and training *really* are in developed countries has yet to be found. We would be taking a step in this direction if an international group of researchers from various countries

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[32] L. Borghans and W. Smits: *Underutilisation and Wages of HVE-Graduates*

[33] P. Van Eijs and H. Heijke: *The Implications of a Mismatch between Occupation and Education.*

[34] C. Belzil, J. Hansen: *Estimating the Returns to Education from a Non-stationary Dynamic Programming Model.*

[35] G. Ballot, F. Fakhfakh, E. Taymaz: *Firm's Human Capital, R&D and Performance: An International Comparative Study*

(e.g. the United Kingdom, France, Germany, the Netherlands, Spain and Italy) were to agree on a single cost-benefit model and apply it to standardized data from simultaneous surveys. The approach to the differentiation of educational routes developed in the Dutch OSA-Report seems to be promising and worth emulating.

With a few exceptions, hardly any studies have been conducted of the returns on investments in corporate human capital. This is in part because human capital, in business usage, is a diffuse term. Enterprises use *training investment* as a selling point, but it never figures as a separate category in their accounts. This would entail capitalized cost-benefit accounting spread over a number of years and considering depreciation and reinvestment.

But companies do not behave in this way. First, the commercial law provisions for drawing up balance sheets do not permit the capitalization of intangible assets, and second, the costs of training are written off in full in the year they arise, just like wages/salaries and consumption of materials. In other words, corporate accounts do not treat initial and continuing training as investments. It would be a sizeable step forward if companies were to draw up a human capital account as a separate accounting subsystem and introduce evaluation rules. This could provide an effective steering instrument for enterprise managements. So far, initial and continuing training bring the lowest benefits in the year in which they cause the highest costs. It follows from this that the use of accumulated knowledge and experience is free of charge in later years.

The social benefits of human capital, too, have been a subject of only marginal interest to date. The all too frequent practice has been simply to compare investments by the state in the education and training infrastructure with additional tax revenues. Here too, at least in Germany, we have the problem that public-sector accounting has reduced the education budget to expenditures and receipts, ignoring accruals on the investment.[36]

Another problem is that social returns models of the education system are always incomplete if they fail to consider the secondary effects of rising education standards among the workforce as a whole. The expansion of education is something which Schumpeter (1912)once called an investment of the dynamic investor. The value added of this investment conceals an innovation which destroys older and technically less innovative capital assets at a stroke. In the case of education expansion, this innovation has also been accompanied by depreciation. Existing knowledge and experience must be *written off*. These write-offs make their impact on the economics of education and training in the form of retraining programmes, early retirement, support for the unemployed and other social transfers. The costs are a burden on the community as a whole and must be subtracted from the social returns. In many cases these are likely to be very low if not negative.

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[36] The German Federal Statistical Board is currently carrying out a survey of all spending on general and vocational education as a contribution to OECD statistics. The project deliberately avoids the term *training investment*. It rather seeks to estimate *training expenditure*.

APPENDIX: FIGURES AND TABLES

Figure 1:

Factors determining corporate growth and employment

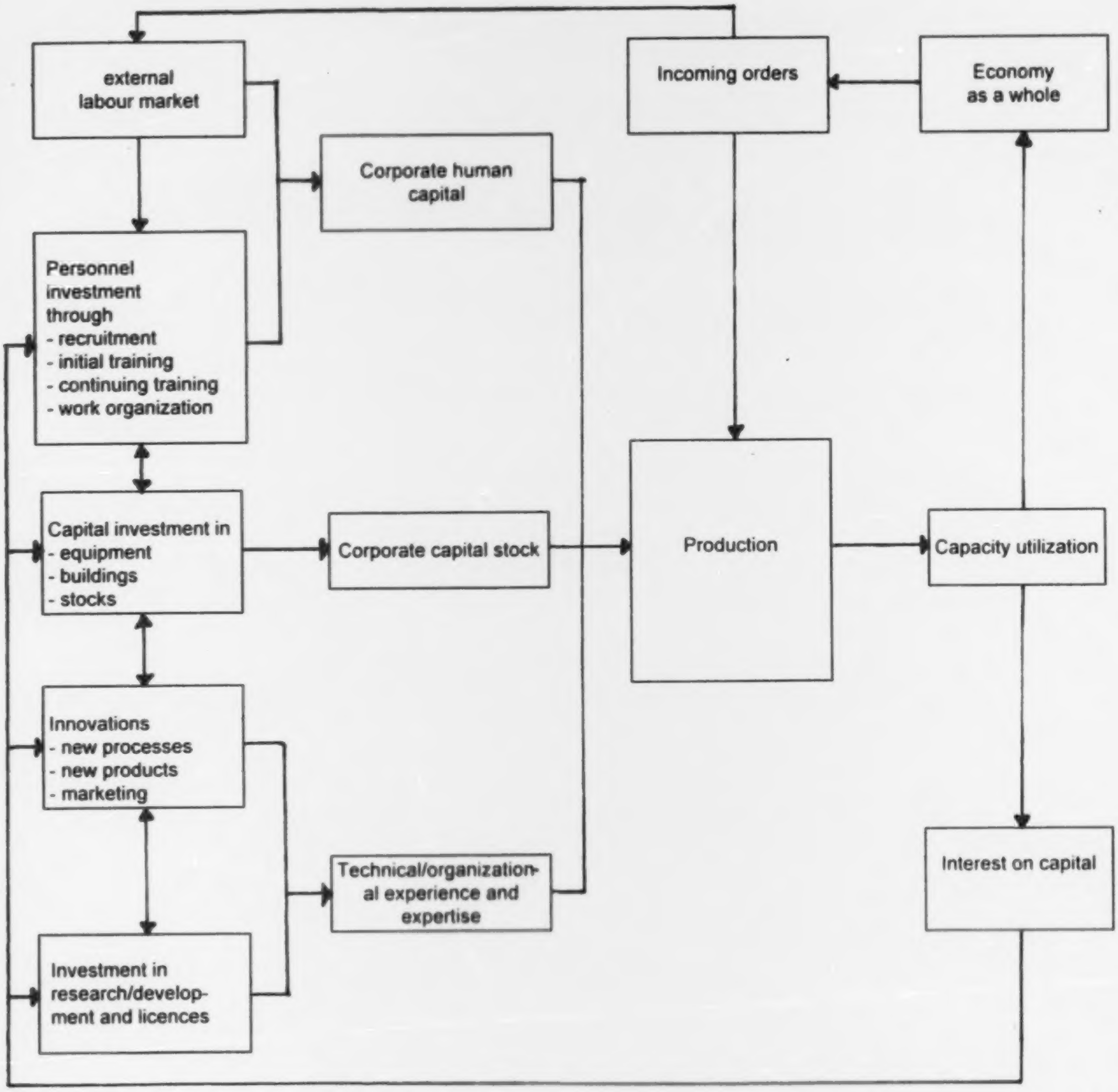
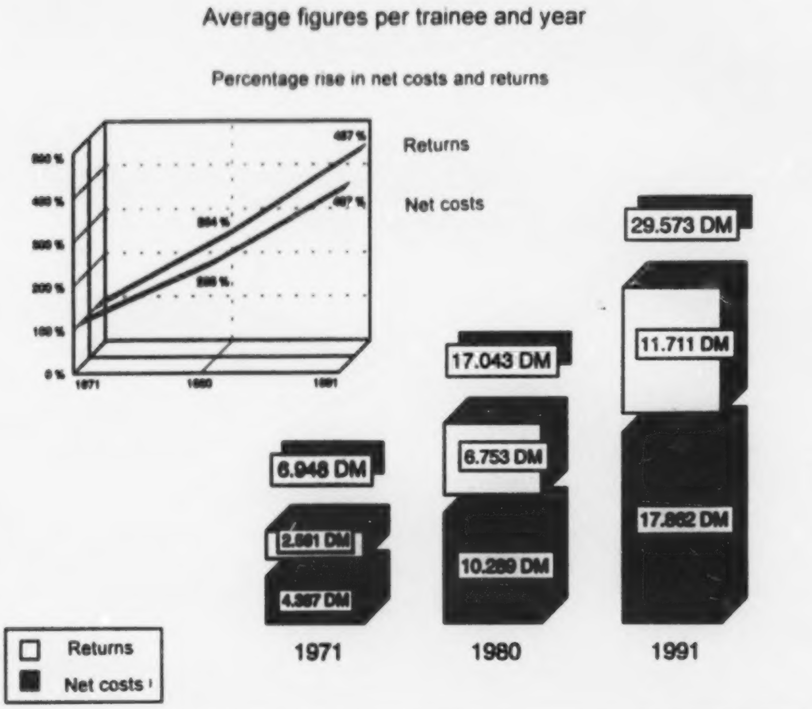

external labour market
Incoming orders
Economy as a whole
Corporate human capital
Personnel investment through
- recruitment
- initial training
- continuing training
- work organization
Capital investment in
- equipment
- buildings
- stocks
Corporate capital stock
Production
Capacity utilization
Innovations
- new processes
- new products
- marketing
Technical/organizational experience and expertise
Interest on capital
Investment in research/development and licences

Figure 2:

Total gross costs, returns and net costs in 1971, 1980 and 1991 (*full costing method*)

West Germany



Source: Federal Institute for Vocational Training

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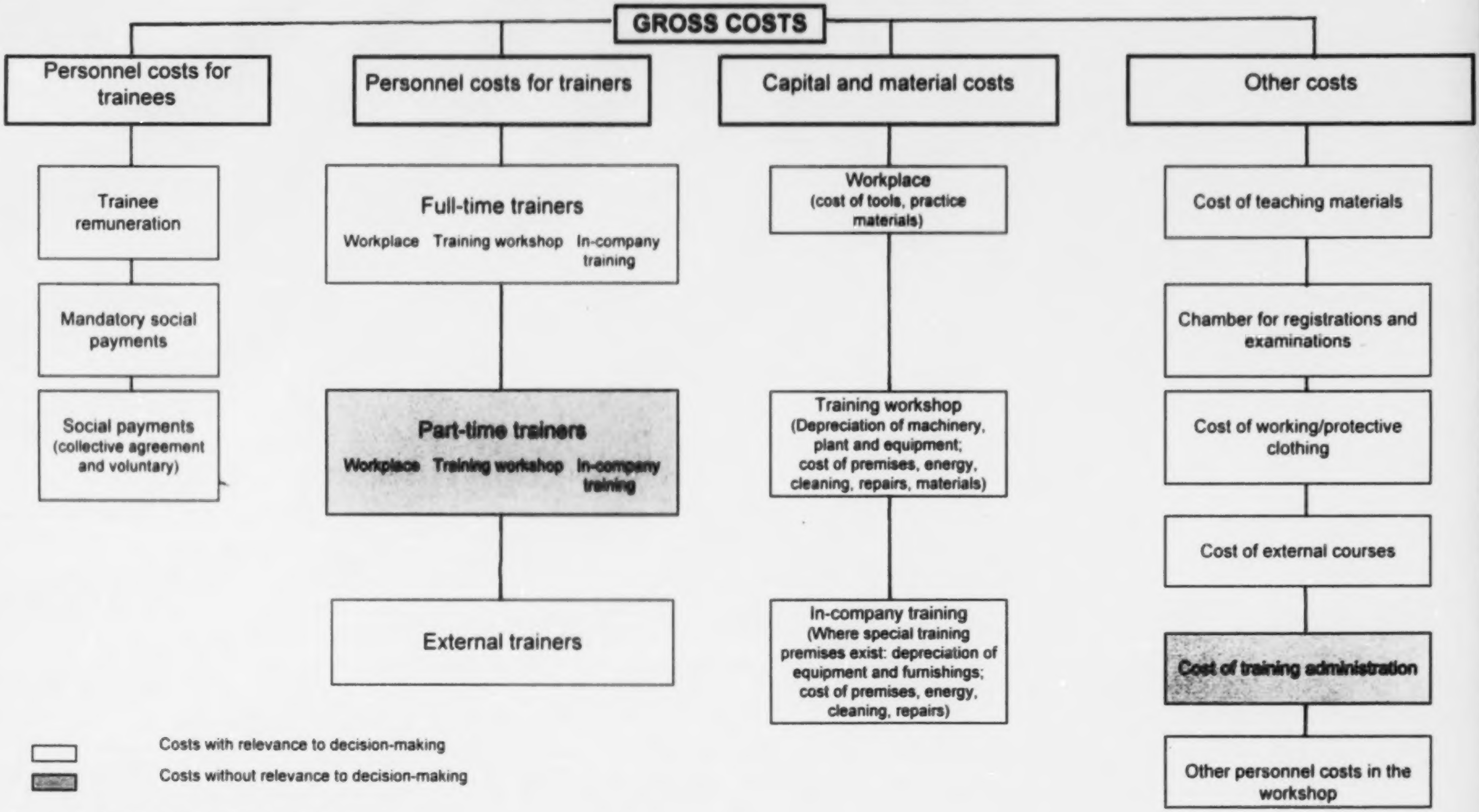
Figure 3:

Cost types in in-company vocational training


GROSS COSTS
Personnel costs for trainees
Trainee remuneration
Mandatory social payments
Social payments (collective agreement and voluntary)
Personnel costs for trainers
Full-time trainers
Workplace
Training workshop
In-company training
Part-time trainers
Workplace
Training workshop
In-company training
External trainers
Capital and material costs
Workplace (cost of tools, practice materials)
Training workshop (Depreciation of machinery, plant and equipment; cost of premises, energy, cleaning, repairs, materials)
In-company training (Where special training premises exist: depreciation of equipment and furnishings; cost of premises, energy, cleaning, repairs)
Other costs
Cost of teaching materials
Chamber for registrations and examinations
Cost of working/protective clothing
Cost of external courses
Cost of training administration
Other personnel costs in the workshop
Costs with relevance to decision-making
Costs without relevance to decision-making

Source: Federal Institute for Vocational Training

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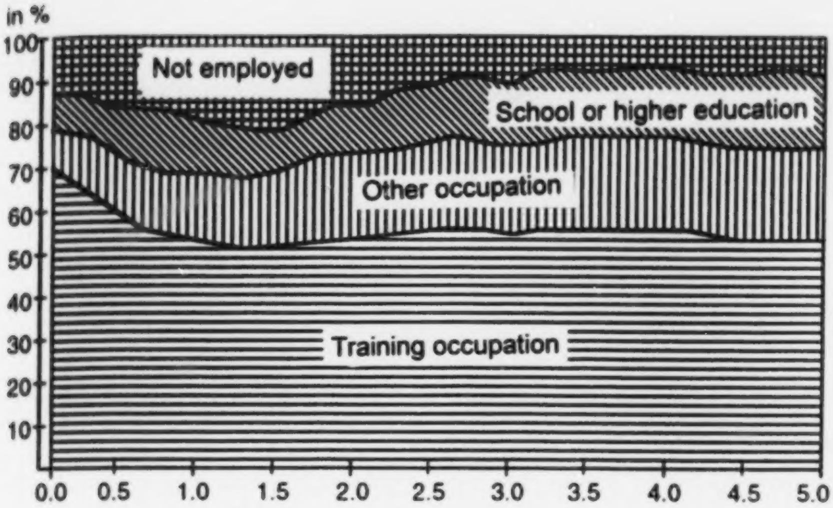
Figure 4:

Employment situation of persons with apprentice qualifications in the first five ears after completion of training, West Germany

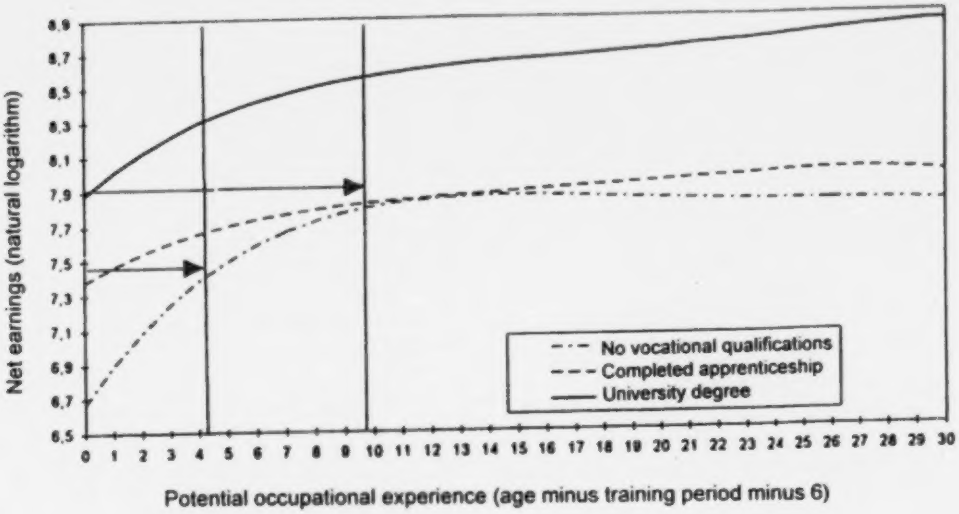


Year(s) after training

Source: Federal Institute for Vocational Training, Bonn, 1993

Figure 5:

Estimated net earnings as a function of occupational experience and highest vocational qualifications, Baden-Württemberg, 1991



Source: Pfeiffer 1996, p. 9

Figure 6:

Individual costs of continuing vocational training
- costs and types of refunding -

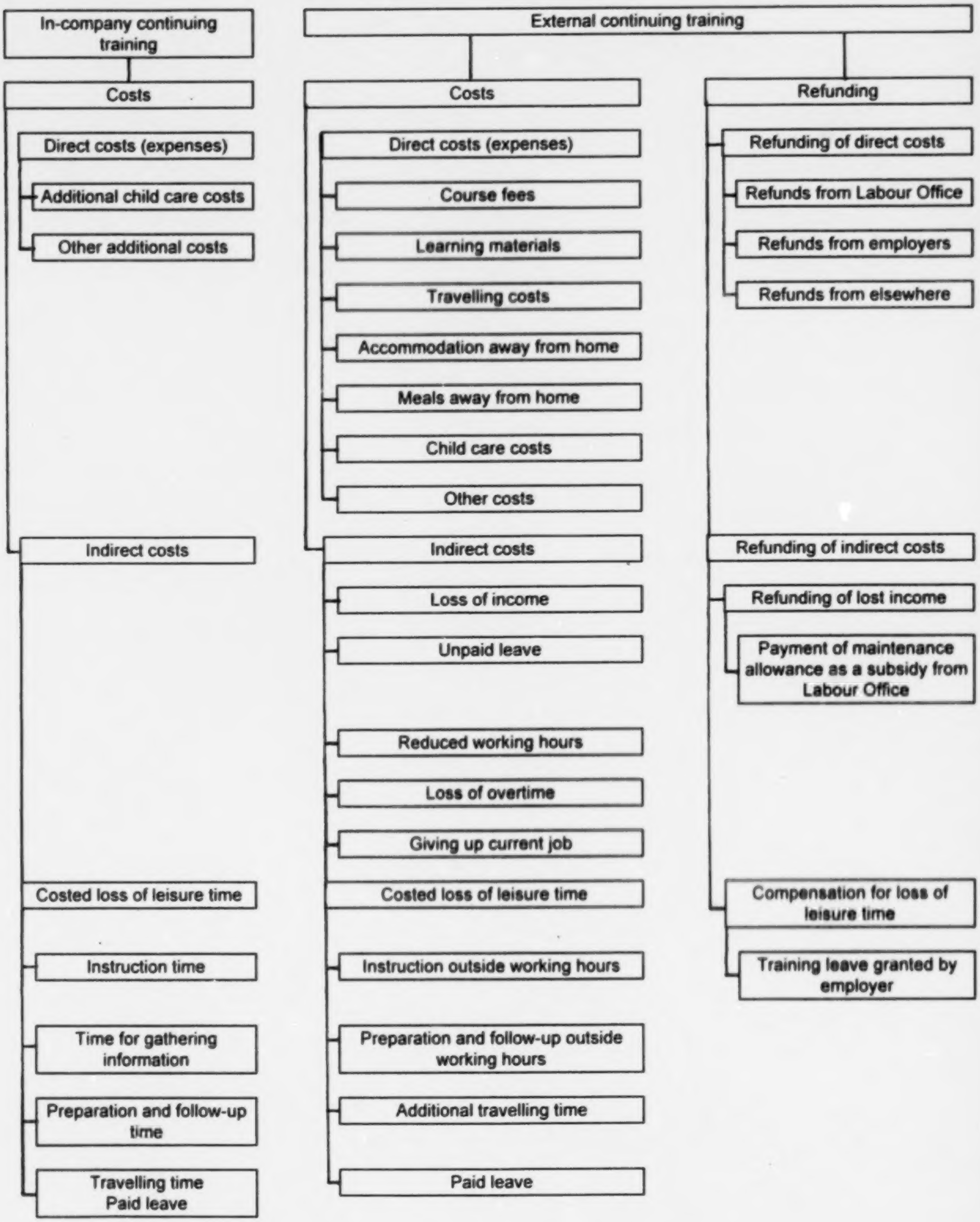
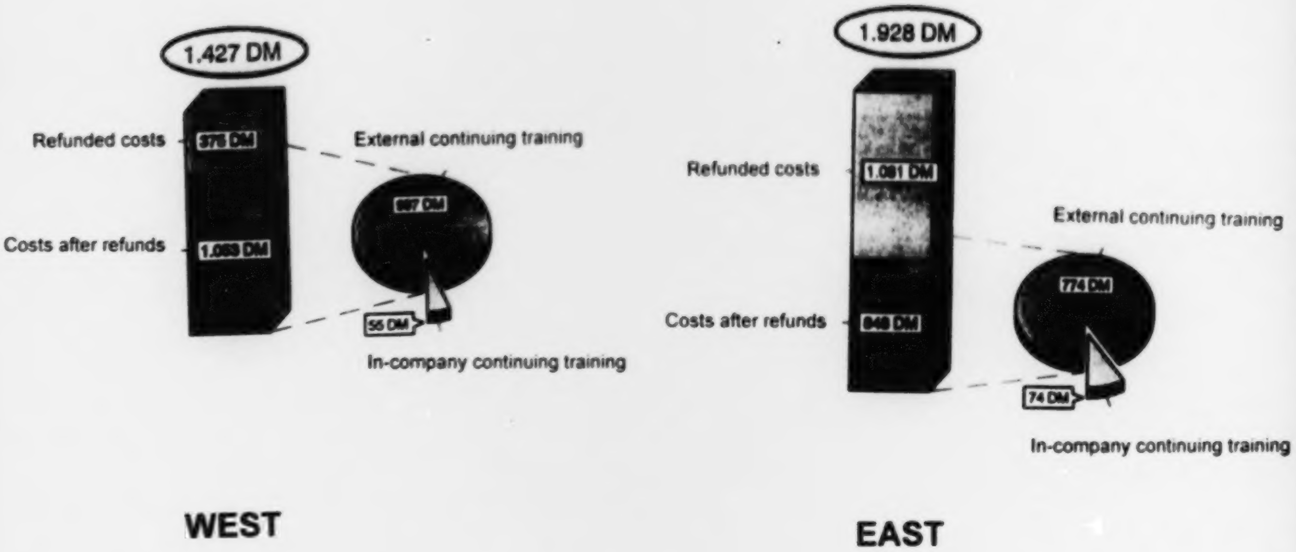

In-company continuing training
Costs
Direct costs (expenses)
Additional child care costs
Other additional costs
Indirect costs
Costed loss of leisure time
Instruction time
Time for gathering information
Preparation and follow-up time
Travelling time
Paid leave
External continuing training
Costs
Direct costs (expenses)
Course fees
Learning materials
Travelling costs
Accommodation away from home
Meals away from home
Child care costs
Other costs
Indirect costs
Loss of income
Unpaid leave
Reduced working hours
Loss of overtime
Giving up current job
Costed loss of leisure time
Instruction outside working hours
Preparation and follow-up outside working hours
Additional travelling time
Paid leave
Refunding
Refunding of direct costs
Refunds from Labour Office
Refunds from employers
Refunds from elsewhere
Refunding of indirect costs
Refunding of lost income
Payment of maintenance allowance as a subsidy from Labour Office
Compensation for loss of leisure time
Training leave granted by employer

Figure 7:

Individual costs of continuing vocational training before and after refunds
West Germany 1992

Average costs per participant and year



Source: Federal Institute for Vocational Training

Table 1:

Average enterprise training costs per trainee and year in industry and commerce, subdivided according to trade/technical and commercial, occupations (*Full costing method*) - West Germany 1991

Cost types	Overall average in industry and commerce		Average by occupations			
			Trade/technical occupations		Commercial occupations	
	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (GC)	31.824	100.0	30.737	100.0	32.388	100.0
Returns	11.315	35.5	10.258	33.3	11.863	36.6
Net costs	20.509	64.4	20.479	66.6	20.524	63.3
Personnel costs for trainees *of which:*	15.930	50.0	13.898	45.2	16.985	52.4
Trainee remuneration	11.313	35.5	9.943	32.2	12.024	37.1
Mandatory social payments	2.359	7.4	2.179	7.0	2.452	7.5
Social payments (collective agreement and voluntary)	2.089	6.5	1.628	5.2	2.329	7.1
Costs for trainers *of which:*	12,018	37.7	12,011	39.0	12,021	37.1
Full-time trainers	1,821	5.7	4,017	13.0	682	2.1
Part-time trainers	10,093	31.7	7,970	25.9	11,194	34.5
Capital and material costs	1,236	3.8	2,603	8.4	527	1.6
Other costs *of which:*	2639	8.3	2,225	7.2	2,853	8.8
Teaching materials	165	0.5	159	0.5	168	0.5
Fees to respective chamber	238	0.7	252	0.8	231	0.7
Working/protective clothing	86	0.2	217	0.7	18	0.0
External courses	747	2.3	139	0.4	1,063	3.2
Training administration	1,23	3.8	930	3.0	1,374	4.2

Source: Federal Institute for Vocational Training

Table 2:

Average enterprise training costs per trainee and year in craft trade sector, subdivided according to trade/technical and commercial occupations (*Full costing method) - West Germany 1991*

Cost types	Overall average in industry and commerce		Average by occupations			
			Trade/technical occupations		Commercial occupations	
	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (GC)	24,889	100.0	25,410	100.0	22,131	100.0
Returns	12,536	50.3	12,112	47.6	14,785	66.8
Net costs	12,352	49.6	13,298	52.3	7,346	33.1
Personnel costs for trainees *of which:*	11,323	45.4	11,339	44.6	11,237	50.7
Trainee remuneration	8,283	33.2	8,294	32.6	8,220	37.1
Mandatory social payments	2,010	8.0	2,009	7.9	2,013	9.0
Social payments (collective agreement and voluntary)	907	3.6	912	3.5	880	3.9
Costs for trainers *of which:*	10,889	43.7	11,235	44.2	9,062	40.9
Full-time trainers	200	0.8	238	0.9	0	0.0
Part-time trainers	10,673	42.8	10,978	43.2	9,062	40.9
Capital and material costs	657	2.6	752	2.9	155	0.7
Other costs	2,019	8.1	2,085	8.2	1,676	7.6
of which:						
Teaching materials	89	0.3	89	0.3	85	0.3
Fees to respective chamber	264	1.0	273	1.0	215	0.9
Working/protective clothing	160	0.6	179	0.7	62	0.2
External courses	194	0.7	204	0.8	144	0.6
Training administration	1,280	5.1	1,301	5.1	1,170	5.2

Source: Federal Institute for Vocational Training

Table 3:

Average enterprise training costs per trainee and year in six selected industrial and commercial occupations (*Full and partial costing methods*)) - West Germany 1991

Cost types	Constuction mechanic		Industrial mechanic		Wholesale and foreign trade clerk		Retail clerk		Bank clerk		Industrial clerk	
	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (full costing method) (GC)	33,360	100.0	39,273	100.0	28,113	100.0	26,337	100.0	32,768	100.0	30,111	100.0
Returns	7,789	23.3	10,841	27.6	13,899	49.4	15,524	58.9	10,258	31.3	15,920	52.9
Net costs (full costing method)	25,571	76.7	28,432	72.4	14,214	50.6	10,813	41.1	22,510	68.7	14,191	47.1
Personnel costs for trainees *of which:*	15,812	47.4	15,385	39.2	14,552	51.8	14,815	56.3	18,960	57.9	15,618	51.9
Trainee remuneration	10,570	31.7	10,705	27.3	10,520	37.4	10,962	41.6	12,970	39.6	11,026	36.6
Mandatory social payments	2,415	7.2	2,429	6.2	2,124	7.6	2,199	8.3	2,606	8.0	2,281	7.6
Social payments (collective agreement and voluntary)	2,668	8.0	2,091	5.3	1,750	6.2	1,489	5.7	3,189	9.7	2,146	7.1
Costs for trainers *of which:*	11,326	34.0	16,837	42.9	11,358	40.4	9,393	35.7	10,416	31.8	12,852	42.7
Full-time trainers	8,224	24.7	11,462	29.2	946	3.4	1,454	5.5	2,220	6.8	1,689	5.6
Part-time trainers	2,894	8.7	5,373	13.7	10,337	36.8	7,829	29.7	8,140	24.8	11,092	36.8
Capital and material costs	4,011	12.0	5,174	13.2	786	2.8	5995	2.3	1,153	3.5	172	0.6
Other costs *of which:*	2,211	6.6	1,877	4.8	1,417	5.0	1,535	5.8	2,239	6.8	1,469	4.9
Teaching materials	280	0.8	110	0.3	94	0.3	154	0.6	235	0.7	117	0.4
Fees to respective chamber	380	1.1	176	0.4	240	0.9	223	0.8	176	0.5	175	0.6
Working/protective clothing	371	1.1	281	0.7	32	0.1	81	0.3	0	0.0	2	0.0
External courses	94	0.3	17	0.0	257	0.9	232	0.9	847	2.6	128	0.4
Training administration	826	2.5	491	1.3	795	2.8	844	3.2	981	3.0	1,047	3.5
Gross costs (*Partial costing method)*	29,640	-	33,409	-	16,981	-	17,664	-	23,647	-	17,972	-
Net costs (*Partial costing method*)	21,852	-	22,567	-	3,082	-	2,141	-	13,388	-	2,052	-

Source: Federal Institute for Vocational Training

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Table 4:

Average enterprise training costs per trainee and year in six selected craft trade ccupations (*Full and partial costing methods*) West Germany 1991

Cost types	Motor mechanic		Electrical fitter		Joiner		Hairdresser		Specialized salesperson in food trade		Office clerk	
	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC	DM	% of GC
Gross costs (full costing method) (GC)	20,765	100.0	23,973	100.0	24,402	100.0	22,425	100.0	23,992	100.0	23,867	100.0
Returns	13,451	64.8	10,562	44.1	13,281	54.4	10,915	48.7	17,091	71.2	13,704	57.4
Net costs (full costing method)	7,314	35.2	13,410	55.9	11,121	45.6	11,510	51.3	6,901	28.8	10,163	42.6
Personnel costs for trainees *of which:*	10,575	50.9	10,308	43.0	11,417	46.8	8,523	38.0	10,827	45.1	11,440	47.9
Trainee remuneration	7,317	35.2	7,437	31.0	8,541	35.0	6,251	27.9	8,115	33.8	7,940	33.3
Mandatory social payments	2,029	9.8	1,875	7.8	1,885	7.7	1,869	8.3	1,899	7.9	2,259	9.5
Social payments (collective agreement and voluntary)	1,119	5.4	884	3.7	863	3.5	309	1.4	691	2.9	1,122	4.7
Costs for trainers *of which:*	7,668	36.9	11,705	48.8	10,067	41.3	10,800	48.2	12,047	50.2	10,494	44.0
Full-time trainers	86	0.4	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Part-time trainers	7,578	36.5	11,696	48.8	10,067	41.3	10,376	46.3	12,047	20.2	10,494	44.0
Capital and material costs	472	2.3	380	1.6	950	3.9	628	2.8	103	0.4	158	0.7
Other costs *of which:*	2,049	9.9	1,580	6.6	1,970	8.1	2,473	11.0	1,014	4.2	1,776	7.4
Teaching materials	111	0.5	153	0.6	18	0.1	99	0.4	25	0.1	70	0.3
Fees to respective chamber	400	1.9	231	1.0	216	0.9	196	0.9	181	0.8	214	0.9
Working/protective clothing	435	2.1	185	0.8	117	0.5	101	0.4	52	0.2	54	0.2
External courses	244	1.2	124	0.5	129	0.5	216	1.0	20	0.1	65	0.3
Training administration	806	3.9	887	3.7	1,380	5.7	1,603	7.1	736	3.	1,373	5.8
Gross costs (*Partial costing method)*	12,381	-	11,389	-	12,955	-	10,446	-	11,208	-	12.000	-
Net costs (*Partial costing method*)	- ,070	-	827	-	- 325	-	- 469	-	- 5,882	-	- 1,703	-

Source: Federal Institute for Vocational Training

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Table 5:

Summary of cost indicators for continuing training, West Germany 1993

	Costs by programme / event of continuing training	Costs per employee	Costs per participant	Costs per participant-hour	Costs as percentage of gross wages and salary bill
Full and part-time continuing trainers	2,324	243	403	12	0.4
In-company training	18,470	862	1,826	60	1.3
External training	8,561	375	3,116	71	0.6
Information sessions	3,770	70	525	65	0.1
Retraining	23,450	38	2,322	26	0.0
On-the-job learning	-	256	-	21	0.3
Self-regulated learning	-	62	-	21	0.1
Other costs	159	19	32	1	0.0
Total	14,633	1,924	2,275	-*	2.8

Source: R. Weiss, *Arten, Strukturen und Entwicklungen der Weiterbildungskosten*, p. 149

Table 6:

Earnings function estimates for men in full-time employment, 1976 to 1987 (schooling model), West Germany

Year	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Duration of schooling	0.057 (95.62)	0.059 (100.23)	0.061 (103.45)	0.060 (102.95)	0.058 (100.97)	0.058 (103.78)	0.059 (104.39)	0.061 (108.44)	0.061 (104.34)	0.061 (105.03)	0.060 (103.54)	0.059 (104.82)
Occupational experience	0.018 (68.82)	0.019 (72.10)	0.019 (71.33)	0.019 (71.62)	0.019 (72.51)	0.019 (73.04)	0.019 (70.34)	0.019 (68.82)	0.020 (65.59)	0.020 (62.55)	0.020 (61.43)	0.021 (63.74)
Square of occupational experience	- 0.00069 (114.96)	- 0.00070 (117.40)	- 0.00068 (115.49)	- 00065 (115.39)	- 0.00063 (115.10)	- 0.00061 (115.28)	- 0.00059 (111.42)	- 0.00058 (109.41)	- 0.00059 (105.71)	- 0.00056 (100.67)	- 0.00056 (98.88)	- 0.00055 (100.11)
Constant	3.543	3.575	3.611	3.688	3.762	3.806	3.836	3.837	3.884	3.905	3.948	3.963
R^2	0.330	0.335	0.334	0.327	0.319	0.321	0.317	0.324	0.323	0.316	0.313	0.313
SE	0.262	0.267	0.271	0.274	0.275	0274	0.278	0.280	0.293	0.297	0.300	0.298
Sample size	97 739	100 517	101 599	105 327	106 693	108 150	107 320	106 353	107 406	107 327	109 129	110 172

Source: L. Bellmann, A. Reinberg, M. Tessaring, *Bildungsexpansion, Qualifikationsstruktur und Einkommensverteilung*, p. 52

Table 7:

Private returns to education, Spain 1990/91

	Women		Men	
	Public Sector	Private Sector	Public Sector	Private Sector
Primary education (vs. less than primary education)	11.4	12.5	9.0	7.8
Secondary education (vs. primary education)	9.8	24.1	5.0	14.5
Basic vocational training (vs. primary education)	2.9	35.0	5.4	21.4
Higher vocational training (vs. basic vocational training)	10.6	15.3	7.4	10.1
Specialized college of higher education (vs. secondary education)	19.5	34.8	7.8	26.8
University (vs. specialized college of higher education)	19.8	12.4	12.6	32.6

Source: Lassibille 1997, table 5

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SECTOR-SPECIFIC, INTERMEDIATE AND HIGH SKILLS AND THEIR IMPACT ON PRODUCTIVITY AND GROWTH IN MANUFACTURING SECTORS OF THE EUROPEAN UNION

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ABSTRACT

This paper analyses the effects of intermediate and high skills on both the level and growth of productivity in manufacturing sectors in seven Member States of the European Union, distinguishing between four effects: worker, allocative, diffusion and research. The former two static effects determine the productivity *level*, whereas the latter two dynamic effects determine productivity *growth*. The paper shows that manufacturing sectors can be divided into three categories of sectors with different intensities of highly-skilled workers: low-skill, medium-skill and high-skill sectors. The estimation results show that both intermediate and high skills have a positive effect on the labour productivity level of most sectors. This holds true in particular for France, Great Britain and Spain. In contrast, in Germany and Denmark the effects of intermediate and high skills on labour productivity are relatively small. Remarkably, for highly-skilled labour the effect is small and not significant in the high-skill category of sectors, which might point to over-investment of high skills in the high-skill sectors. However, in particular highly-skilled labour has a strong and significantly positive effect on the growth in sectoral productivity in the high-skill category of sectors. Therefore the paper concludes that it may be wrong to judge from a static analysis that there is an over-investment in skills, since dynamic, i.e. growth, implications of investments in skills should also be considered.

1. INTRODUCTION

Measuring the returns on investment in different types of education and training can give useful information for policy makers. However, most studies in this field only consider the returns on investment in types of education and training in one particular country. In this paper the returns on investments in both intermediate and high skills are considered across seven Member States[1] of the European Union. These returns of intermediate and high skills are assumed to be indicated by both the level and the growth of sectoral productivity. Moreover, the paper offers a framework for understanding the effects of intermediate and high skills on productivity.

On the basis of the human capital theory, reference will be made to four different effects of human capital on productivity: the 'worker effect', the 'allocative effect', the 'diffusion effect' and the 'research effect'. The former two effects determine the *level of* productivity, whereas the latter two effects determine *growth* in productivity. Human capital is measured by the sectoral employment shares of intermediate and highly-skilled workers. Although it is widely accepted that the distinction between the intermediate-skilled 'craft' workers and highly-skilled 'professionals' is very important for explaining productivity differences (e.g. Prais 1981; Daly 1986; Campbell/Warner 1991; Lindley 1991), this distinction has not yet been made in the empirical research on the effects of human capital on productivity.[2]

The paper distinguishes between low-skill, medium-skill and high-skill sectors. These categories of sectors are expected to have different productivity effects of intermediate and high skills. The distinction between the categories of sectors is based on the *rankings* of sectors by the employment shares of highly-skilled workers. These sector rankings are relatively similar across countries, although the actual employment shares of intermediate and highly-skilled workers themselves can be very different across countries (see Cörvers 1997). The paper compares the sectoral employment shares of intermediate and highly-skilled labour to their effects on sectoral productivity. Since the effects of intermediate and high skills on sectoral productivity are supposed to be equal across countries for a particular category of sectors, the paper can draw conclusions on the over-investment (or under-investment) in intermediate and high skills in sectors that reveal relatively large (or small) shares of intermediate and highly-skilled labour.

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[1] Belgium, Germany, Denmark, Spain, France, Great Britain and The Netherlands are included. For data reasons, other countries are excluded.

[2] An exception is Cörvers (1997), in which, however, no distinction is made between low-skill, medium-skill and high-skill sectors (see below).

The paper is organized as follows. Section 2 attempts to describe the nature of intermediate and high skills, and explains the effects of these skills on productivity. Section 3 deals with the differences in employment shares of intermediate and highly-skilled labour, i.e. skill intensities, across the seven countries in the sample. This section reveals that manufacturing sectors can be classified into low-skill, medium-skill and high-skill sectors. For these categories of sectors, section 4 estimates the effects of intermediate and high skills on the sectoral productivity level. Moreover, some conclusions are drawn on the over- and under investment of intermediate and high skills. Section 5 estimates the effects of intermediate and high skills on the sectoral productivity growth. Section 6 concludes this paper.

2. THE EFFECTS OF INTERMEDIATE AND HIGH SKILLS ON PRODUCTIVITY

Ryan (1991) defines intermediate skills as "those above routine skills but below professional ones". For statistical analyses such a definition is probably satisfactory. However, definitions of skills say little about what is really learned when acquiring particular skills and about how the acquired skills affect workers' productivity. A taxonomy of cognitive skills, for example the taxonomy of Bloom (see for example Arents et al. 1996), may be a starting point for understanding the effects of different types of skills on productivity. This taxonomy contains a ranking of cognitive skills. Higher ranked skills can be acquired only after lower ranked skills have been obtained. Based on such a taxonomy we can differentiate between low, intermediate and high skills. Furthermore, these three skill levels partly resemble the differentation between routine skills, applied skills and conceptual skills made by Ashton et al. (1991). Nevertheless, low, intermediate and high skills are heterogeneous in content and the boundaries between them are imprecise. Low skills consist of the remembering of previously learned material and the practised ability to achieve concrete results. By knowing methods and procedures, workers can perform the elementary tasks required in the production process in the same way, time and time again. Therefore low skills are often characterised as being routine. As a consequence, low skills are often not transferable to other contexts, i.e. they can be characterized as context-specific. The higher the level of skills, the less context-specific they are. Low skills are particularly useful in large batch and mass production industries.

Intermediate skills reflect the ability to understand the meaning of the learned material and enable workers to apply the learned material in a variety of contexts. Unlike low skills, intermediate skills evolve as technological knowledge increases and are applicable in a wide range of differing production techniques. Intermediate skills may be particularly useful in more complex and non-standardized production processes. High skills also build on the features of intermediate skills, but in addition enable workers to analyse, synthesize and evaluate the learned material. High skills are also known as problem-solving skills, due to which workers are able to break down knowledge into parts, to marshall parts to form new patterns and structures, and to evaluate the learned material. High skills can be used to think through problems and to resolve problems that come up in new situations, for example when new technologies are introduced (see for example Bartel/Lichtenberg 1987). Therefore high skills are in particular found in industries in which research and development activities play an important role.

Intermediate and high skills are supposed to be acquired by investments in education and training. In contrast, low (or routine) skills are mainly acquired by learning-by-doing. In other words, the stock of intermediate and high skills of workers represents their accumulated stock of past investment in education and training. This stock of skills represents the human capital stock of workers. Four different effects of human capital on productivity can be found in economic literature: worker, allocative, diffusion and research (see also Cörvers 1994).[3] The effects are based on the studies of Nelson/Phelps (1966), Welch (1970), Ram (1980) and Pencavel (1991), among others. These effects are, however, often treated separately in both theoretical and empirical studies[4]. Furthermore, the studies that refer to these effects do not distinguish between the effects of low, intermediate and high skills on productivity. Below we will argue that the first and second of these effects underpin the relevance of skills for the *level of productivity*, whereas the latter two effects underpin the relevance of skills for *growth in productivity*.

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[3] The remaining part of this section draws on Cörvers (1997).

[4] See Cörvers (1997) for a discussion of the empirical literature on these effects.

- The first of these, the worker effect (or 'own productivity' effect) has been explained by Welch (1970). He assumes that firms produce only one good with the production factor education, and that other resources are given. The worker effect refers to the positive marginal productivity of education with respect to that particular good. Workers with a higher level of education are assumed to be more efficient in working with the resources at hand, i.e. these workers produce more physical output. In other words, education increases the effective labour input from the hours worked. Therefore a better educated labour force shifts the production possibility curve outwards. According to Welch (1970) the worker effect is presumably "related to the complexity of the physical production process." The more complex the production technique is, the more 'room' is left for the worker effect to improve the (technical) efficiency of production. An increase in the proportion of intermediate or highly-skilled workers, relative to low-skilled workers, can increase the productivity level in physical units.

- Second, the allocative effect points to the greater (allocative) efficiency of better educated workers in allocating all input factors to the production process (including education itself) between the alternative uses. Welch (1970) gives two examples of the allocative effect. If there is one fixed input factor to produce two goods (or varieties), education may improve the total revenues of firms by means of a better allocation of the input factor between the alternative outputs. Although the production process is technically efficient because the firm produces on the production possibility curve (expressed in physical units), workers have more knowledge of how to maximize the marginal value product (expressed in money units) of the input factor. Total revenues are maximized if the marginal value product of the input factor is equalized for all goods. Another allocative effect is present if, in addition to education as an input factor, two (or more) other inputs are included in the production function. If just one good is produced with two inputs, education may also help to select the efficient quantities of inputs. In equilibrium the marginal value product of the inputs should equal the price of the inputs. In fact, education seems to provide the skills to make better decisions based upon the available information. This is also stated by Ram (1980): "Education generally has the effect of lowering the (marginal) costs of acquiring production-related information, and of raising the (marginal) benefits of such information." As a result of the allocative effect, an increase in the relative proportions of intermediate and highly-skilled is expected to lead to a higher productivity level in money units.

- Third, the diffusion effect stresses that better educated workers are more able to adapt to technological change and will introduce new production techniques more quickly. Nelson/Phelps (1966) state that "educated people make good innovators, so that education speeds the process of technological diffusion" (see also Bartel/Lichtenberg 1987). Moreover, Nelson/Phelps (1966) stress the role of receiving, decoding and understanding information in performing a job.[5] A higher level of education increases the ability to discriminate between more and less profitable innovations and reduces the uncertainty about investment decisions with regard to new processes and products. Therefore education increases the probability of successful and early adoption of innovations. Higher proportions of intermediate and highly-skilled workers, relative to low-skilled workers, would be expected to lead to more rapid and successful adoption of innovations and higher productivity growth. However, since innovations lead to new production processes, it is expected that in particular high skills are required to achieve productivity growth by rapidly and successfully adopting innovations.

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[5] In fact the diffusion effect can be regarded as a special case of the allocation effect (see Welch 1970).

- Fourth, the research effect refers to the role of higher education as an important input factor in research and development (R&D) activities. R&D, in turn, is a key factor in technological progress and productivity growth (see, for example, the endogenous growth models in Romer 1990 and Grossman/Helpman 1992). Since R&D activities are very complex,[6] a relatively large proportion of specialized intermediate and in particular highly-skilled workers is a prerequisite for increasing technological knowledge and achieving productivity growth (see also Englander/Gurney 1994).

3. THE SKILL INTENSITY OF MANUFACTURING SECTORS

Ranking the manufacturing sectors by skill intensities enables us to identify low-skill, medium-skill and high-skill sectors. The section begins by discussing the rankings of the employment shares of intermediate and highly-skilled labour for the fifteen manufacturing sectors, followed by a discussion of the rank correlations between the rankings of the manufacturing sectors of the countries.[7]

Table 1 shows the all-country average employment shares of low-skilled workers (*LS*), intermediate-skilled workers (*IS*) and highly-skilled workers (*HS*) for each sector in the seven countries of the sample in both 1988 and 1991. For almost all sectors the average employment shares of intermediate and highly-skilled workers are at least as large in 1991 as in 1988. To distinguish between low-skill, medium-skill and high-skill manufacturing sectors, the sectors are ranked according to the 1988 average employment share of highly-skilled workers. As will be argued below, this ranking is relatively similar across countries, in contrast with the ranking according to the employment shares of intermediate-skilled workers.

Table 1: **All-country average employment shares of low, intermediate and highly-skilled labour, 1988, 1991**

	LS_{88}	IS_{88}	HS_{88}	LS_{91}	IS_{91}	HS_{91}
high-skill sectors						
chemicals	0.48	0.31	0.21	0.42	0.34	0.24
electrical machinery	0.50	0.31	0.19	0.44	0.34	0.21
professional goods	0.49	0.35	0.17	0.50	0.35	0.15
non-electrical machinery	0.49	0.35	0.16	0.44	0.38	0.18
medium-skill sectors						
petroleum	0.56	0.29	0.15	0.52	0.32	0.16
paper and printing	0.57	0.32	0.12	0.52	0.36	0.12
basic metals	0.63	0.26	0.11	0.55	0.32	0.13
transport equipment	0.58	0.32	0.10	0.53	0.36	0.11
low-skill sectors						
rubber and plastic	0.65	0.27	0.08	0.62	0.29	0.09
other manufacturing	0.67	0.26	0.07	0.62	0.31	0.08
metal products	0.63	0.30	0.07	0.57	0.35	0.08
non-metallic minerals	0.66	0.27	0.07	0.62	0.30	0.08
food, beverages and tobacco	0.67	0.26	0.07	0.61	0.30	0.08
textiles, apparel and leather	0.70	0.24	0.06	0.67	0.26	0.07
wood	0.67	0.28	0.05	0.61	0.34	0.05

Note: The sectors are ranked according to the 1988 all-country average employment share of highly-skilled labour.

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[6] Notice that the research effect is similar to the worker effect in that both are related to the complexity of the production process.

[7] See appendix A for the data sources and the employment shares of intermediate and highly-skilled workers per sector for seven countries of the European Union in 1988. For each country, the sectors are ranked according to the employment share of highly-skilled workers. Table A.2 shows the abbrevations of the manufacturing sectors. See Cörvers (1997) for a discussion of the sector employment shares of intermediate and highly-skilled workers for each country of the sample.

The following high-skill sectors were selected from the 15 manufacturing sectors: chemicals, electrical machinery, professional goods and non-electrical machinery. The all-country average employment share of highly-skilled workers in the high-skill sectors is at least 0.15, and the average employment share of low-skilled workers in the high-skill sectors is never greater than 0.50. In addition, it is possible to identify four medium-skill sectors: petroleum, transport equipment, paper and printing, and basic metals. In the medium-skill sectors, the all-country average employment share of highly-skilled workers is between 0.10 and 0.15, and the average employment share of low-skilled workers is between 0.50 and 0.60. However, the petroleum sector is an exception, since the employment share of highly-skilled labour in 1991 is greater than 0.15. The remaining sectors are termed the 'low-skill' sectors. In these sectors the average employment share of highly-skilled workers is smaller than 0.10, and the average employment share of low-skilled workers is larger than 0.60 (except for the metal products sector in 1991).[8] However, it should be noticed that in some countries particular sectors do not fit in the above ranking and categories of low-skill, medium-skill and high-skill sectors.

Table 2 shows the Spearman rank correlations between the sector rankings of countries according to the 1988 employment shares intermediate and highly-skilled workers. For intermediate-skilled labour the rank correlations of only three pairs of countries are significant at 5%, whereas for highly-skilled labour the rank correlations of all pairs of countries are significant at 5%. Moreover, most rank correlations for highly-skilled labour are even significant at 1%. This implies that the ranking of the average all-country employment shares of highly-skilled workers as in table 1 is appropriate to distinguish between low-skill, medium-skill and high-skill sectors, despite the exceptions of the sectors in some countries mentioned in Cörvers (1997). Ranking the sectors of the sample according to the all-country average employment shares of intermediate-skilled workers results in a rank order of sectors that differs much more from the rank orders of the individual countries.

Table 2:

Spearman rank correlations between the employment shares of 15 manufacturing sectors, 1988

	B	D	DK	E	F	GB	NL
Intermediate-skilled labour (IS)							
Belgium (BEL)	1.00						
Germany (DEU)	0.34	1.00					
Denmark (DNK)	0.03	0.09	1.00				
Spain (ESP)	0.55	0.38	0.10	1.00			
France (FRA)	0.31	0.36	0.19	0.60	1.00		
Great Britain (GBR)	0.29	0.54	0.16	0.50	0.05	1.00	
Netherlands (NLD)	0.51	0.40	0.19	0.51	0.33	0.36	1.00
Highly-skilled labour (HS)							
Belgium (BEL)	1.00						
Germany (DEU)	0.53	1.00					
Denmark (DNK)	0.54	0.45	1.00				
Spain (ESP)	0.86	0.63	0.76	1.00			
France (FRA)	0.79	0.82	0.73	0.91	1.00		
Great Britain (GBR)	0.74	0.70	0.70	0.91	0.89	1.00	
Netherlands (NLD)	0.59	0.62	0.51	0.75	0.70	0.72	1.00

Note: the rank correlation has a 5%-significance at 0.441; 2.5%-significance at 0.525; 1%-significance at 0.623.

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[8] See Papaconstantinou (1995) for other classifications of sectors, including a similar classification of unskilled and skilled sectors. See OECD (1986) and Verspagen (1995) for a similar classification with regard to the level of technology, which can be measured by the R&D intensity (R&D expenditures relative to production).

4. THE STATIC EFFECTS OF INTERMEDIATE AND HIGH SKILLS ON PRODUCTIVITY

This section presents the results of estimating the worker and the allocative effect on sectoral productivity levels. These effects have been discussed before. Based on the theoretical insights of the human capital model of Appendix B conclusions will be drawn on over or under-investment of intermediate and high skills in the manufacturing sectors in the various countries analysed. In appendix B the combined worker and allocative effect are represented by the coefficients θ_{IS} and θ_{HS} for intermediate and high skills, respectively. From Appendix B it follows that, from a static point of view, there can be no over-investment in intermediate and high skills if the effects of intermediate and high skills are larger than the respective sectoral employment shares of intermediate and highly-skilled labour, i.e. $\theta_{IS} > IS$ and $\theta_{HS} > HS$. This section will analyse whether these latter conditions hold true for the low-skill, medium-skill and high-skill categories of sectors. These conditions will then be considered for each individual sector. However, for a final conclusion on over or under-investment in human capital, the dynamic effects should be included. These dynamic effects will be estimated in the next section.

The cross-section regression analysis of this section estimates the elasticities of output with respect to physical capital, firm size and intermediate and highly-skilled labour of 13 manufacturing sectors in six or seven countries.[9] To correct for sectoral differences in production functions, the manufacturing sectors are divided into categories of sectors which are assumed to have equal elasticities of output with respect to the explanatory variables. The estimated effects of intermediate and highly-skilled labour on sectoral labour productivity are assumed to be equal within the categories of low-skill, medium-skill and high-skill sectors. These categories have been presented in table 1.

Table 3 shows the estimation results for the worker and allocative effect of intermediate and highly-skilled labour. The manufacturing sectors are presented in descending order of skill intensity of highly-skilled labour (as in table 1). The columns show the estimated coefficients and the t-values in brackets. The estimated coefficients, $\hat{\theta}_{IS}$ and $\hat{\theta}_{HS}$, indicate the estimated combined worker and allocative effect of intermediate and highly-skilled labour, respectively.

The results show that the estimated equations with respect to the static effects of the production factors on productivity perform very well. Table 3 shows that the employment share of intermediate-skilled workers, *IS*, has a significant effect on the labour productivity of all sectors, which implies that the combined worker and allocative effect is significant for intermediate-skilled labour. The estimated (worker and allocative) effect of intermediate-skilled workers, $\hat{\theta}_{IS}$, is 0.42 in 1988 and 0.41 in 1991 for the low-skill sectors. For the high-skill sectors $\hat{\theta}_{IS}$ is even larger, 0.64 in 1988 and 0.54 in 1991. For the medium-skill sectors $\hat{\theta}_{IS}$ is approximately in between the effects in the low-skill and the high-skill sectors in 1988 (0.50), and equal to the effect in the high-skill sectors in 1991 (0.54). However, usually the estimated effect with respect to intermediate-skilled labour is not significantly different between the low-skill, the medium-skill and the high-skill sectors (except for the high-skill sectors in 1988).

As pointed out above, in order to fulfil the investment condition with respect to intermediate-skilled labour, $\hat{\theta}_{IS} > IS$, the estimated worker and allocative effect are compared to the employment shares of intermediate-skilled labour. It can be seen from the all-country averages in Table 1 that the low-skill, medium-skill as well as the high-skill sectors have smaller average all-country employment shares of intermediate-skilled workers than the estimated effects of intermediate-skilled labour above. This implies that the investment condition for intermediate-skilled labour is fulfilled in all three categories of manufacturing sectors distinguished.

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[9] The petroleum and other manufacturing sectors are not included in the sample of 15 manufacturing sectors of the last section, since the valued added per worker and the capital intensity of these sectors vary widely between countries which indicates that they are very heterogeneous between countries. France cannot be included if the average firm size is an explanatory variable. See Appendix C for the technical details of the regression analyses and for the estimated coefficients of physical capital and the average firm size.

Next, table 3 shows that $\hat{\theta}_{HS}$ is significantly positive in the low-skill sectors in both 1988 and 1991: 0.13 and 0.23 respectively. Moreover, for the medium-skill sectors the estimated worker and allocative effect is significant for both years: 0.18 and 0.32 respectively. In order to fulfill the investment condition with respect to highly-skilled labour, $\hat{\theta}_{HS} > HS$, the estimated worker and allocative effect are compared to the employment shares of highly-skilled labour. From the all-country average employment share of highly-skilled labour in table 1 it may be concluded that this condition is fulfilled for the low-skill and the medium-skill sectors in both 1988 and 1991. However, the high-skill category of sectors of the countries in the sample has a relatively small and insignificant $\hat{\theta}_{HS}$ in both 1988 and 1991. Since the all-country average employment shares of highly-skilled labour are large in the category of high-skill sectors, a relatively large $\hat{\theta}_{HS}$ might have been expected. On the contrary, the above condition is not fulfilled for the category of high-skill sectors. This means that there is no evidence for the worker and allocative effect in the category of high-skill sectors. Therefore from a static point of view, over-investment in highly-skilled labour is apparent in the category of high-skill sectors. Finally, for all categories of sectors, $\hat{\theta}_{HS}$ is at least 0.10 larger in 1991 than in 1988 and $\hat{\theta}_{HS}$ is smaller than $\hat{\theta}_{IS}$ in both 1988 and 1991.

Table 3:

Estimated worker and allocative effect of intermediate (*IS*) and high (*HS*) skills 1988, 1991

	$\hat{\theta}_{IS}$	$\hat{\theta}_{HS}$
1988		
high-skill sectors	0.64 (4.27)^{c}	0.06 (0.46)
medium-skill sectors	0.50 (3.38)^{c}	0.18 (1.69)^{a}
low-skill sectors	0.42 (3.53)^{c}	0.13 (2.07)^{b}
$\bar{R}^2$	0.77	
F-stat	5.6^{c}	
Observations	76	
1991		
high-skill sectors	0.54 (3.04)^{c}	0.16 (0.92)
medium-skill sectors	0.54 (3.09)^{c}	0.32 (2.02)^{b}
low-skill sectors	0.41 (2.89)^{c}	0.23 (2.48)^{b}
$\bar{R}^2$	0.71	
F-stat	12.0^{c}	
Observations	76	

Notes: The absolute t-values are between brackets. The superscripts *a*, *b* and *c* indicate a significant coefficient at the 10%, 5% and 1% level, respectively.

To judge whether there is under or over-investment of human capital within the individual sectors of the categories of sectors distinguished above, it is necessary to take a closer look at the output elasticities of intermediate and highly-skilled labour for each individual sector. As stated in Appendix B, the output elasticities with respect to the employment shares of both intermediate and highly-skilled labour have to be larger than zero for profit maximization without over-investment in human capital. These elasticities can be calculated by substituting the sectoral employment shares of Appendix A and the estimated worker and allocative effect of table 3 into the equations (B.7) and (B.8).

Table 4a:

Output elasticities with respect to intermediate skills, 1988 and 1991

	B	D	DK	E	F	UK	NL
1988							
high-skill sectors							
chemicals	0.40	0.18	-0.09	0.48	0.53	0.49	0.23
electrical machinery	0.41	0.24	0.02	0.47	0.53	0.46	0.30
professional goods	0.32	0.10	0.28	0.45	0.57	0.50	0.26
non-electrical machinery	0.43	0.14	-0.01	0.48	0.57	0.46	0.27
medium-skill sectors							
paper and printing	0.32	0.04	-0.01	0.38	0.43	0.36	0.24
basic metals	0.34	0.12	0.13	0.34	0.41	0.33	-
transport equipment	0.35	0.10	-0.33	0.36	0.41	0.31	0.19
low-skill sectors							
rubber and plastic	0.22	0.00	-0.07	0.31	0.35	0.30	0.16
metal products	0.22	-0.15	-0.25	0.31	0.36	0.27	0.14
non-metallic minerals	0.25	-0.03	-0.41	0.33	0.36	0.31	0.20
food, beverages and tobacco	0.22	-0.01	-0.05	0.32	0.36	0.31	0.13
textile, apparel and leather	0.29	0.02	-0.09	0.35	0.37	0.35	0.16
wood	0.22	-0.15	-0.01	0.35	0.38	0.25	0.18
1991							
high-skill sectors							
chemicals	0.24	-0.16	0.06	0.30	0.37	0.33	0.07
electrical machinery	0.25	-0.17	0.03	0.30	0.39	0.32	0.10
professional goods	0.21	-0.16	-0.25	0.36	0.44	0.36	0.29
non-electrical machinery	0.26	-0.22	-0.16	0.33	0.43	0.31	0.14
medium-skill sectors							
paper and printing	0.36	0.20	0.26	0.41	0.43	0.40	0.34
basic metals	0.36	0.18	0.27	0.36	0.40	0.38	-
transport equipment	0.37	0.15	0.19	0.38	0.41	0.37	0.31
low-skill sectors							
rubber and plastic	0.17	0.10	0.11	0.28	0.31	0.25	0.16
metal products	0.21	0.04	-0.34	0.26	0.33	0.24	0.12
non-metallic minerals	0.18	0.09	0.03	0.28	0.31	0.25	0.15
food, beverages and tobacco	0.19	0.04	0.01	0.29	0.32	0.26	0.13
textile, apparel and leather	0.26	0.10	0.05	0.30	0.33	0.31	0.19
wood	0.21	0.04	-0.08	0.30	0.33	0.21	0.10

Notes: See table 2 for the abbreviations of the countries. France has been excluded from the regression analysis. Including France in the regression analysis does not heavily affect the estimation results.

Table 4a presents the output elasticities with respect to the employment shares of intermediate-skilled labour. It follows that the German and Danish output elasticities are very small or negative, except for the 1988 output elasticities of the high-skill sectors in Germany and the 1991 output elasticities of the medium-skill sectors in both Germany and Denmark. In general the output elasticities with respect to intermediate-skilled labour indicate that there is over-investment in intermediate-skilled labour in the German and Danish manufacturing sectors (from a static point of view, see below). On the contrary, the output elasticities with respect to intermediate-skilled labour in Spain, France and Great Britain are very large relative to the other countries of the sample. This may point to under-investment in intermediate-skilled labour. Increasing the employment share of intermediate-skilled workers may raise both profits and the sectoral labour productivity level in these countries.

Table 4b:

Output elasticities with respect to high skills, 1988 and 1991

	B	D	DK	E	F	GB	NL
1988							
high-skill sectors							
chemicals	-0.07	-0.11	-0.24	-0.00	-0.02	-0.02	-0.16
electrical machinery	-0.08	-0.12	-0.13	0.02	-0.02	-0.01	-0.14
professional goods	-0.14	-0.13	-0.05	0.00	0.01	-0.01	-0.05
non-electrical machinery	-0.06	-0.11	-0.11	0.02	-0.00	-0.04	-0.03
medium-skill sectors							
paper and printing	0.08	0.07	0.04	0.14	0.12	0.12	0.11
basic metals	0.12	0.08	-0.01	0.13	0.12	0.12	-
transport equipment	0.13	0.06	0.10	0.13	0.12	0.10	0.07
low-skill sectors							
rubber and plastic	0.03	0.05	0.06	0.09	0.09	0.08	0.06
metal products	0.07	0.01	0.04	0.10	0.10	0.09	0.07
non-metallic minerals	0.07	0.04	0.06	0.10	0.10	0.08	0.05
food, beverages and tobacco	0.04	0.02	0.08	0.10	0.10	0.08	0.08
textile, apparel and leather	0.09	0.05	0.05	0.11	0.11	0.11	0.06
wood	0.08	-0.01	0.09	0.11	0.11	0.09	0.11
1991							
high-skill sectors							
chemicals	-0.07	-0.39	-0.11	0.06	0.06	0.03	-0.09
electrical machinery	-0.02	-0.23	-0.04	0.07	0.05	0.05	-0.06
professional goods	0.03	-0.45	-0.11	0.12	0.12	0.06	0.05
non-electrical machinery	0.01	-0.56	-0.03	0.09	0.08	0.05	0.02
medium-skill sectors							
paper and printing	0.22	0.09	0.22	0.25	0.25	0.24	0.23
basic metals	0.22	0.10	0.19	0.22	0.23	0.22	-
transport equipment	0.23	0.08	0.22	0.24	0.23	0.22	0.21
low-skill sectors							
rubber and plastic	0.13	-0.19	0.14	0.17	0.16	0.15	0.15
metal products	0.14	-0.51	0.10	0.18	0.17	0.17	0.16
non-metallic minerals	0.11	-0.24	0.14	0.17	0.17	0.16	0.14
food, beverages and tobacco	0.13	-0.35	0.14	0.17	0.17	0.16	0.14
textile, apparel and leather	0.16	-0.26	0.13	0.19	0.18	0.17	0.15
wood	0.16	-0.50	0.16	0.19	0.18	0.17	0.17

Note: See table 4a.

Table 4b shows that most output elasticities with respect to the employment share of highly-skilled labour are negative or very small for the high-skill sectors of all countries, except for the 1991 output elasticities of the high-skill sectors in Spain and France. This implies that one of the abovementioned investment conditions is not satisfied for most manufacturing high-skill sectors. This confirms the more aggregated analysis with regard to the categories of sectors in tables 2 and 3, which is based upon average all-country employment shares of highly-skilled labour. Thus, over-investment of highly-skilled labour seems to be likely in the high-skill sectors in almost all countries of the sample. Moreover, the German output elasticities with respect to highly-skilled labour are also negative or very small for the low-skill sectors. In general the medium-skill sectors have the largest output elasticities with respect to highly-skilled labour, whereas the output elasticities with respect to highly-skilled labour are usually larger in 1991 than in 1988. However, to draw a final conclusion on the over and under-investment of human capital, the dynamic effects of human capital have to be considered first.

5. THE DYNAMIC EFFECTS OF INTERMEDIATE AND HIGH SKILLS ON PRODUCTIVITY

This section estimates the diffusion and the research effect of intermediate and high skills on productivity growth. As pointed out by the human capital model of Appendix B, the diffusion effect of human capital can be measured by the effect of the relative employment shares of intermediate and highly-skilled labour on total factor productivity growth, whereas the research effect of (both intermediate and highly-)skilled R&D workers can be measured by the effect of the relative R&D intensity on total factor productivity growth. These two effects will be estimated for the low-skill, medium-skill and high-skill categories of sectors distinguished in Section 3.

Table 5 shows the estimation results of the diffusion and research effect of intermediate and high skills.[10] The estimated equation is significant at the 1% level, although the adjusted R-squared is only 32%. The estimated diffusion effect of intermediate-skilled workers, $\hat{\gamma}_{IS}$, is positive for all sectors, though only significantly positive for the low-skill sectors. Furthermore, the estimated diffusion effect of highly-skilled workers, $\hat{\gamma}_{HS}$, is significantly positive for the low-skill and the high-skill sectors, and insignificantly positive for the medium-skill sectors. In particular for the high-skill sectors the estimated diffusion effect is relatively large and significantly different from the estimated diffusion effect in the low-skill sectors.

The estimated research effect of R&D workers, $\hat{\gamma}_{RD}$, is only positive and significant for the low-skill category of sectors, which is difficult to explain. Moreover, it is contrary to the results of Verspagen (1995), who finds that the R&D capital stock has a relatively large and significantly positive effect on output growth in the high-tech sectors (which are almost similar to the high-skill sectors) and a smaller and insignificant effect on output growth in the low-tech and the medium-tech sectors. This may be due to the differences in the production function used and the difference in the measurement in the R&D input (e.g. Verspagen uses R&D stocks). On the other hand, the results of table 5 may also point to the relevance of the diffusion effect instead of the research effect of human capital for the high-skill sectors. Diffusion of technological knowledge could be more important for productivity growth than active involvement in research and development of the sector itself.

The results of table 5 show that one should be very careful about drawing conclusions on over-investment in human capital from a static point of view. In particular, the static (worker and allocative) effect of highly-skilled labour relative to the employment share of highly-skilled labour is very small and insignificant in the high-skill sectors, which leads to the apparent conclusion of over-investment of highly-skilled labour in these sectors. This conclusion is, however, wrong from a dynamic point of view, since highly-skilled labour has a large and significantly positive effect on the sectoral productivity growth of high-skill sectors. Moreover, since there is also some evidence for the diffusion effect of intermediate and highly-skilled workers in the low-skill and the medium-skill sectors, one should be very careful about drawing conclusions on the over-investment of human capital in, for example, Germany and Denmark. The positive dynamic effects of human capital on productivity growth may outweigh the losses caused by the sub-optimal skill structure in the static sense.

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[10] Country dummies are not included in the regression analysis, since they do not alter the results significantly. Moreover, the null hypothesis that all dummy variables are zero cannot be rejected.

Finally, the manufacturing sectors in countries that seem to have under-investment in human capital from a static point of view are even worse off if the dynamic effects are also considered. This holds true for example for the employment shares of intermediate-skilled labour in the low-skill sectors of Spain, France and Great Britain.

Table 5:

Estimated diffusion and research effect of intermediate and high skills, 1988-1991

	$\hat{\gamma}_{IS}$	$\hat{\gamma}_{HS}$	$\hat{\gamma}_{RD}$
high-skill sectors	0.01 (0.31)	0.10 (3.06)^c	-0.01 (0.50)
medium-skill sectors	0.03 (1.43)	0.05 (1.49)	-0.00 (0.11)
low-skill sectors	0.02 (2.09)^b	0.03 (1.79)^a	0.02 (1.93)^a
C	-0.09 (6.74)^c		
$\overline{R}^2$	0.32		
F-stat	5.34^c		
Observations	86		

Notes: The absolute t-values are between brackets. The superscripts *a*, *b* and *c* indicate a significant coefficient at the 10%, 5% and 1% level, respectively.

6. CONCLUSIONS

This paper distinguishes and estimates four effects of intermediate and high skills on sectoral productivity, i.e. the worker effect, the allocative effect, the diffusion effect and the research effect. It has been argued that the static (i.e. worker and allocative) effects of human capital increase the *level* of productivity, whereas the dynamic (i.e. diffusion and research) effects of human capital increase *growth* in productivity. Human capital is measured by the employment shares of intermediate and highly-skilled workers.

If the worker and allocative effect are large relative to the employment shares of intermediate or highly-skilled workers, both profits and productivity can be increased by further raising the employment shares of intermediate and highly-skilled labour. In that case under-investment in human capital is indicated. If the effects are relatively small, over-investment in human capital is likely. However, once the positive dynamic effects of human capital on productivity growth are also included in the analysis over-investment in human capital may not be evident anymore.

The data shows that the rankings of 15 manufacturing sectors by the employment shares of highly-skilled workers are relatively similar across the Member States of the European Union. There is less congruence between the rankings with regard to the employment shares of intermediate-skilled workers. The fifteen manufacturing sectors distinguished are divided into three categories of sectors with different employment shares of highly-skilled workers: low-skill sectors, medium-skill sectors and high-skill sectors.

Least squares estimations for thirteen manufacturing sectors of the sample countries between 1988 and 1991 showed that the effects of intermediate and highly-skilled labour on sectoral labour productivity, which reflect the worker and allocative effect, are significantly positive for all categories of sectors, except for the effect of highly-skilled labour in the category of high-skill sectors. The effects are large relative to the employment shares of intermediate and highly-skilled labour, except for highly-skilled labour in the high-skilled sectors. The latter implies that, from a static point of view there is over-investment of highly-skilled labour in the high-skill sectors.

A closer look at the individual sectors is taken to judge whether there is under or over-investment in intermediate and high skills. Therefore the output elasticities with respect to the employment shares of intermediate and highly-skilled labour are calculated. The output elasticities with respect to the employment shares of intermediate-skilled workers are negative or small for most manufacturing sectors in Germany and Denmark. This implies that from a static point of view there is over-investment of intermediate skills in most German and Danish manufacturing sectors. In contrast, the output elasticities with respect to the employment shares of intermediate-skilled labour are relatively large in the manufacturing sectors of Spain, France and Great Britain, which may point to under-investment of intermediate-skills in these sectors. The output elasticities with respect to the employment shares of highly-skilled labour are negative or small for the manufacturing sectors in the high-skill category of sectors of all countries, which confirms the more aggregated analysis, and also negative or small for the low-skill sectors in Germany. However, a static analysis estimating the worker and allocative effect of the employment shares of intermediate and highly-skilled workers does not account for the dynamic effects of intermediate and high skills on productivity growth.

Least squares estimations to explain sectoral productivity growth showed that the diffusion effect of high skills in the high-skill category of sectors is significantly positive. Moreover, there is some evidence for the diffusion effect of intermediate and high skills in the low-skill category of sectors. Therefore the diffusion effect of intermediate and high skills on productivity growth casts doubt on the apparent over-investment of intermediate skills in the German and Danish manufacturing sectors and on the apparent over-investment of high skills in most high-skill sectors and in the German low-skill sectors. In other words, it may be wrong to conclude from a static analysis alone that there is over-investment of intermediate and high skills in some manufacturing sectors.

On the other hand, the diffusion effect of intermediate skills in the low-skill sectors provides additional evidence on the conclusion that the employment share of intermediate-skilled workers in the Spanish, French and British manufacturing sectors is too small. From a static point of view, an increase in the employment share of intermediate-skilled workers may raise both profits and the productivity level in these sectors, whereas from a dynamic point of view, an increase in the employment share of intermediate-skilled labour may stimulate the introduction of new technologies and thus productivity growth. Finally, there is some evidence to support a research effect of skilled R&D workers. However, this effect has been found in the low-skill category of sectors only, whereas no evidence for the research effect was found for the medium-skill and high-skill categories of sectors.

APPENDIX A: DATA SOURCES

Employment shares of low, intermediate and highly-skilled labour

The data for calculating the employment shares of low, intermediate and highly-skilled labour was drawn from Eurostat's *Labour Force Survey* (1988-1991, see the figures at the end of this appendix). The classification of the skill level is analogous to UNESCO's International Standard Classification of Education (ISCED). ISCED levels 0/1 (pre-primary and primary education) and 2 (lower secondary education) correspond to the skill level of low-skilled labour. ISCED level 3 (higher secondary education) corresponds to the skill level of intermediate-skilled labour, and ISCED levels 5 to 7 (higher university and non-university education) corresponds with the skill level of highly-skilled labour. The numbers of workers in the various NACE[11] classes (at the 2-digit level) have been aggregated to ISIC[12] sectors according to the concordance table listed below. The numbers of intermediate or highly-skilled workers in the NACE classes which are below the threshold value of Eurostat are estimated using the number of intermediate and highly-skilled workers in the NACE divisions (at the 1-digit level). Since there was no data available for France in 1990 and 1991, the employment shares of 1989 have been used as an approximation for 1990 and 1991. Conversely, since there was no data available for The Netherlands in 1988 and 1989, the employment shares of 1990 have been used as an approximation for 1988 and 1989.

Sectoral labour productivity

The variable indicating the average labour productivity per worker in a sector has been calculated by dividing the value added per sector by the number of workers employed per sector. Data on both the value added and the numbers of workers employed was drawn from the STAN industrial database. The STAN database expresses value added in local currencies at constant 1985 prices, except for Spain. The values for Spain have been converted into 1985 prices using sector prices from the United Nations Industrial Statistics (UNIDO) database. Purchasing power parities based on GDP figures, and drawn from the Penn World tables, have then been used to convert the local currencies into 1985 dollar prices. For Spain, the value added per worker in 1990 is used as an approximation for the value added per worker in 1991.

Export/Import ratio

The export and import data is drawn for the STAN industrial database. Sectoral exports in local currencies and current prices are divided by sectoral imports in local currencies and current prices.

Capital intensity

The capital intensity variable has been approximated by the fixed stock of physical capital per worker. Data on gross investments in fixed capital and the number of workers employed was drawn from the STAN industrial database. Stocks of physical capital per sector are constructed using a perpetual inventory method (PIM) for the period of 1970 - 1991, with a depreciation rate of 0.1. The initial stock of capital (in most cases 1970) is calculated as the value of investment of next year, divided by the depreciation rate plus an assumed growth rate of 0.05. Since investments are expressed in local currencies at current prices, these values have been converted into 1985 prices using sector prices from the United Nations Industrial Statistics (UNIDO) database. Purchasing power parities of gross investments, drawn from the Penn World tables, have then been used to convert the local currencies into 1985 dollar prices. For Spain, the capital intensity in 1990 is used as an approximation for the capital intensity in 1991.

Average firm size

The data on the number of establishments in each sector was drawn from the Industrial Structure Statistics (ISS) of the OECD. For most countries data was only available up to 1988. The average firm size has been calculated by dividing the number of establishments by the number of workers employed. The latter data was drawn from the STAN industrial database. For France, no data was available for the number of establishments per sector.

R&D intensity

The variable indicating the level of technological knowledge in a particular sector, is measured using data on research and development expenditures per worker drawn from the Basic Science and Technology Statistics and the STAN industrial database. Purchasing power parities, drawn from the Penn World tables, have then been used to convert the local currencies into 1985 dollar prices.

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[11] General Industrial Classification of Economic Activities, which is used within the European Union.

[12] International Standard Industrial Classification of the United Nations, which is used for the classification of sectors in the STAN database (see below).

Table A.1: Categories of sectors

	capital-intensity	average firm size
high-skill sectors		
chemicals	high	medium
electrical machinery	medium	medium
professional goods	low	small
non-electrical machinery	low	small
medium-skill sectors		
petroleum	high	medium
paper and printing	medium	small
basic metals	high	large
transport equipment	medium	large
low-skill sectors		
rubber and plastic	medium	small
other manufacturing	medium	small
metal products	low	small
non-metallic minerals	high	small
food, beverages and tobacco	high	small
textiles, apparel and leather	low	small
wood	low	small

Note: The sectors are ranked according to the 1988 all-country average employment shares of highly-skilled labour (see table 1).

Table A.2: Classification and abbreviations of ISIC sectors

3100	foo	Food, beverages and tobacco
3200	tex	Textile, wearing apparel and leather industries
3300	woo	Wood and wood products, including furniture
3400	pap	Paper and paper products, printing and publishing
3510+20	che	Industrial chemicals and other chemical products
3530+40	pet	Petroleum refineries and miscellaneous products of petroleum and coal
3550+60	rup	Rubber products and plastic products not elsewhere classified
3600	nme	Non-metallic mineral products, except products of petroleum and coal
3710+20	bmi	Iron and steel basic industries and non-ferrous metal basic industries
3810	pme	Fabricated metal products, except machinery and equipment
3820	mac	Machinery except electrical
3830	ele	Electrical machinery apparatus, appliances and supplies
3840	tra	Transport equipment
3850	opt	Professional, scientific, measuring, controlling equipment not classified elsewhere, photographic and optical goods
3900	oma	Other manufacturing industries

Table A.3: Concordances between ISIC 1977 (rev. 2) and NACE 1970 classifications

ISIC 1977	NACE 1970
3100	41+42
3200	43+44+45
3300	46
3400	47
3510+3520	25+26
3530+3540	11+12+13+14+15+21+23
3550+3560	48
3600	24
3710+3720	22
3810	31
3820	32+33
3830	34
3840	35+36
3850	37
3900	49

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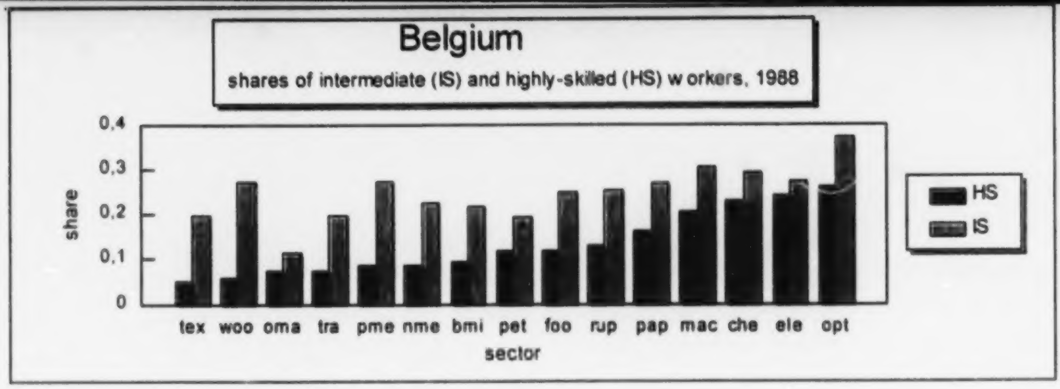
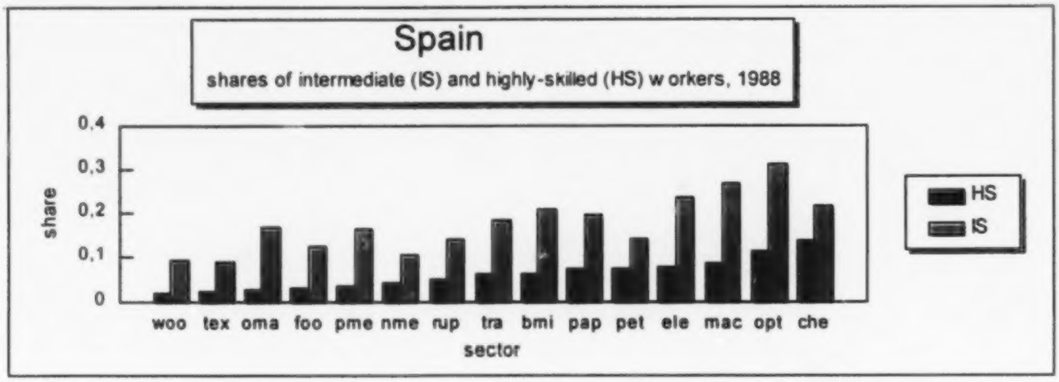
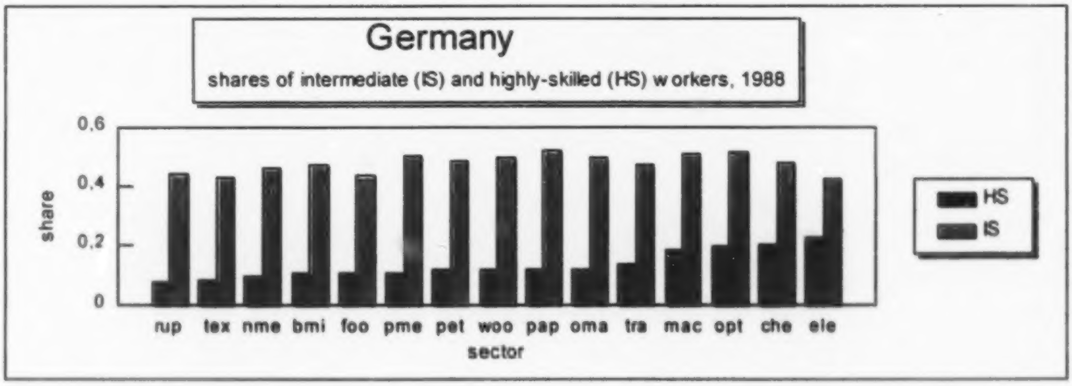
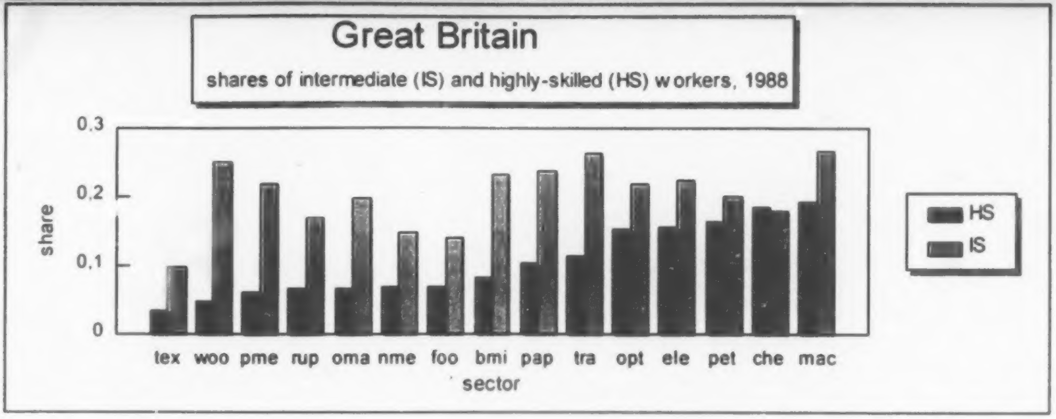

Belgium
shares of intermediate (IS) and highly-skilled (HS) w orkers, 1988
0,4
0,3
0,2
0,1
0
share
tex woo oma tra pme nme bmi pet foo rup pap mac che ele opt
sector
HS
IS

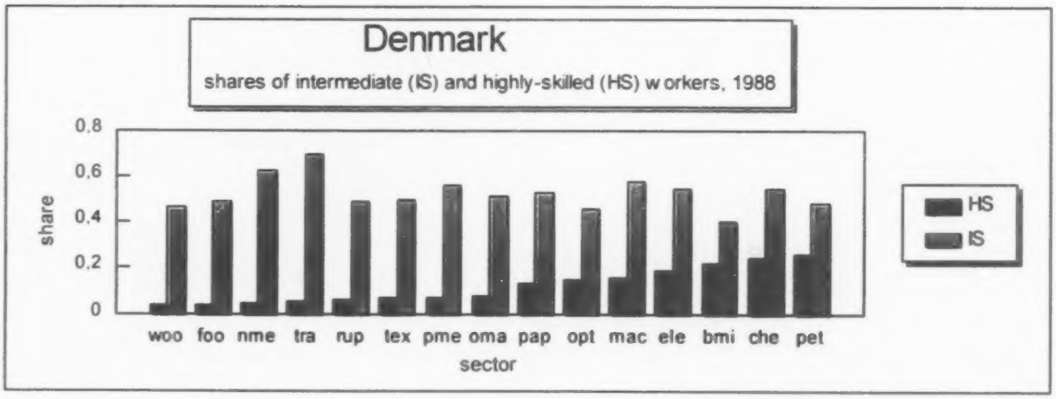

Spain
shares of intermediate (IS) and highly-skilled (HS) w orkers, 1988
0,4
0,3
0,2
0,1
0
share
woo tex oma foo pme nme rup tra bmi pap pet ele mac opt che
sector
HS
IS


Germany
shares of intermediate (IS) and highly-skilled (HS) w orkers, 1988
0,6
0,4
0,2
0
share
rup tex nme bmi foo pme pet woo pap oma tra mac opt che ele
sector
HS
IS



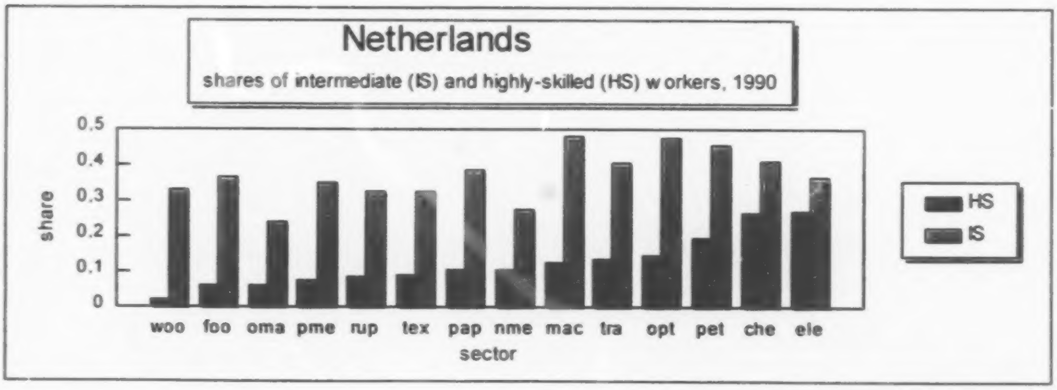
Great Britain

shares of intermediate (IS) and highly-skilled (HS) workers, 1988



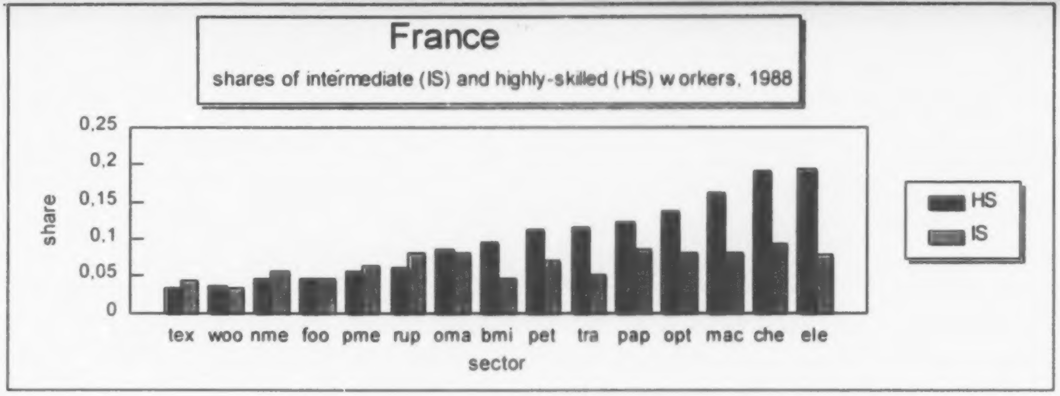
Denmark

shares of intermediate (IS) and highly-skilled (HS) workers, 1988



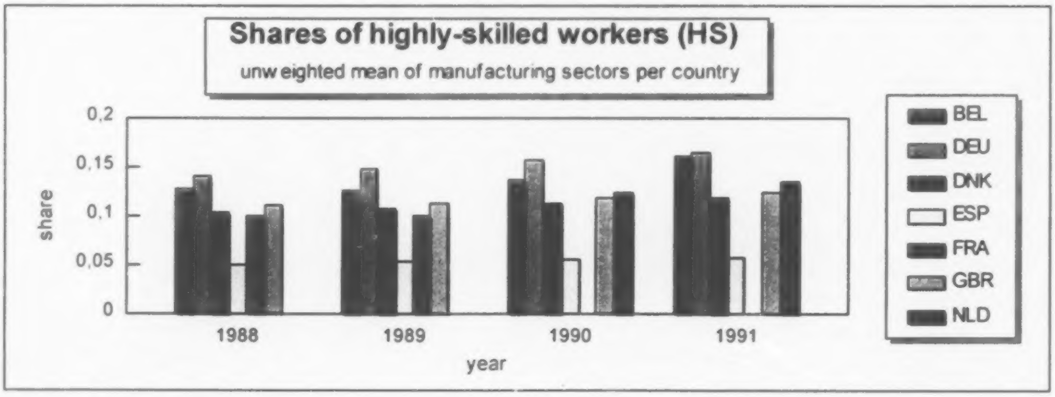
Netherlands

shares of intermediate (IS) and highly-skilled (HS) workers, 1990



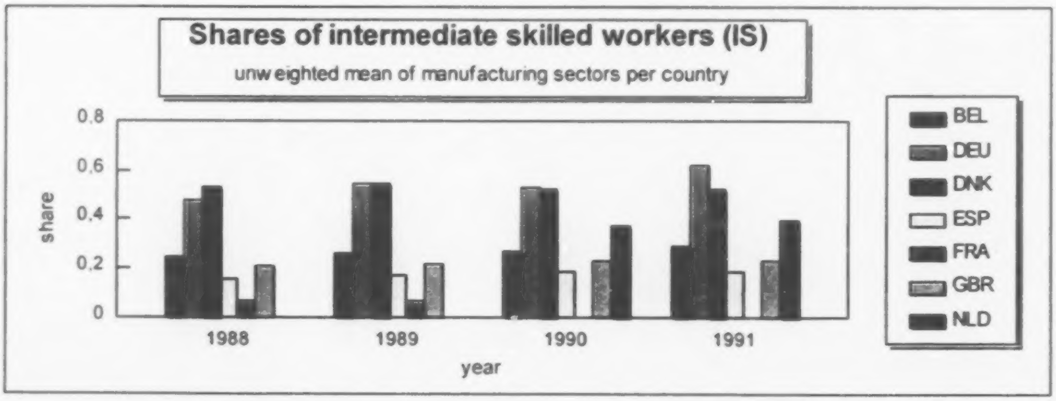
France

shares of intermediate (IS) and highly-skilled (HS) workers, 1988



Shares of highly-skilled workers (HS)

unweighted mean of manufacturing sectors per country



Shares of intermediate skilled workers (IS)

unweighted mean of manufacturing sectors per country

APPENDIX B: OUTLINE OF THE HUMAN CAPITAL MODEL[13]

Suppose that firm *i* produces net output Y_i according to the Cobb-Douglas production function of equation (B.1) with L_i^* units of effective labour and K_i units of physical capital, and that the efficiency parameter *A* is given. The parameters α and β represent the physical capital and labour elasticities of output, respectively.

$$Y_i = A K_i^{\alpha} L_i^{*\beta} \tag{B.1}$$

The L_i^* units of effective labour of a firm consist of both the number of workers (or hours worked), L_i , and human capital. In other words, the effective labour input L_i^* allows for the various characteristics of workers with regard to their human capital. There are various ways to model the effective labour input.[14] Here the effective labour input L_i^* is represented by the employment shares of low, intermediate and highly-skilled labour (LS_i , IS_i and HS_i , respectively) as the input variables, which sum up to 1. The employment shares of intermediate and highly-skilled workers in the firm are used as an approximation for the input of human capital.[15] The following Cobb-Douglas form of effective labour input will be used.

The parameters θ_{LS}, θ_{IS} and θ_{HS} indicate the contribution of low, intermediate and highly-skilled labour, respectively, to the effective labour input. The average labour productivity of a sector can be found by substituting

$$L_i^* = L_i * LS_i^{\theta_{LS}} IS_i^{\theta_{IS}} HS_i^{\theta_{HS}} \tag{B.2}$$

the above equation into equation (B.1) and aggregating the *N* firms of the sector, assuming equal firm sizes, i.e. $\overline{Y} = Y_i$, $\overline{K} = K_i$, $\overline{L^*} = L_i^*$ (see Davies and Caves, 1987).

$$\frac{Y}{L} = \frac{N\overline{Y}}{N\overline{L}} = \frac{A\overline{K}^{\alpha}\overline{L^*}^{\beta}}{\overline{L}} = \frac{A\overline{K}^{\alpha}\overline{L}^{\beta}\overline{LS}^{\beta\theta_{LS}}\overline{IS}^{\beta\theta_{IS}}\overline{HS}^{\beta\theta_{HS}}}{\overline{L}} \tag{B.3}$$

From the above assumptions it follows that the capital intensities and the employment shares of low, intermediate and highly-skilled workers are equal across firms, which results in equation (B.4) for a particular sector.

$$\frac{Y}{L} = A(\frac{K}{L})^{\alpha}\,\overline{L}^{\alpha+\beta 1}\,LS^{\beta\theta_{LS}}\,IS^{\beta\theta_{IS}}\,HS^{\beta\theta_{HS}} \tag{B.4}$$

Equation (B.4) shows that the labour productivity of a sector depends on the efficiency parameter, the sector's capital intensity, the employment shares of low, intermediate and highly-skilled workers in a sector and the average firm size. From equation (B.4) it follows that if the assumption of constant returns to scale holds true ($\alpha + \beta = 1$), the average firm size plays no role.

Substituting *LS* for (1 - *IS* - *HS*) and assuming that $\theta_{LS} = 1 - \theta_{IS} - \theta_{HS}$ gives the following equation:

$$\frac{Y}{L} = A(\frac{K}{L})^{\alpha}\,\overline{L}^{\alpha+\beta 1}\,(1ISHS)^{\beta(1\theta_{IS}\theta_{HS})}\,IS^{\beta\theta_{IS}}\,HS^{\beta\theta_{HS}} \tag{B.5}$$

Taking the natural logarithm of both sides results in equation (B.6).

$$\ln\frac{Y}{L} = \ln A + \alpha\ln\frac{K}{L} + (\alpha+\beta 1)\ln\overline{L} + \beta(1\theta_{IS}\theta_{HS})\ln(1ISHS) + \beta\theta_{IS}\ln IS + \beta\theta_{HS}\ln HS \tag{B.6}$$

The above equation enables us to estimate the effects of human capital on the productivity level of sectors. These effects are represented by the coefficients θ_{IS} and θ_{HS} of intermediate-skilled and highly-skilled labour, respectively. If net output is measured in value terms instead of volumes, as in this chapter, the worker effect and the allocative effect cannot be distinguished from each other (see also Welch, 1970). The coefficients θ_{IS} and θ_{HS} are equal to zero if human capital, represented by the employment shares of intermediate and highly-skilled workers, does not have a combined worker and allocative effect on sectoral labour productivity.

---

[13] This section partly draws on Cörvers (1997).

[14] The major disadvantage of the approach of aggregating human capital inputs is that it is assumed that the separability assumption holds, i.e., the assumption that the levels of non-labour inputs, such as physical capital, have no impact on the relative marginal productivities of the human capital inputs (see, e.g. Fallon 1987 and Cörvers 1994).

[15] Other human capital inputs, for example participation in training courses and years of experience (see Cörvers 1994) are not incorporated in this analysis. These human capital inputs can easily be incorporated if reliable comparative data on aspects such as training intensity is available.

The elasticities of sectoral labour productivity with respect to intermediate and highly-skilled labour (i.e. the elasticities of output) are found by differentiating equation (B.6) to the natural logarithm of *IS* and *HS*, respectively.

$$\frac{d\ln(Y/L)}{d\ln HS} = \frac{d(Y/L)}{dHS}\,\frac{HS}{Y/L} = \beta\frac{\theta_{HS}(1-IS)HS(1\theta_{IS})}{(1ISHS)} \tag{B.8}$$

$$\frac{d\ln(Y/L)}{d\ln IS} = \frac{d(Y/L)}{dIS}\,\frac{IS}{Y/L} = \beta\frac{\theta_{IS}(1-HS)IS(1\theta_{HS})}{(1HSIS)} \tag{B.7}$$

It follows that the elasticities of output with respect to both intermediate-skilled and highly-skilled labour are positive as long as both $\theta_{IS} > IS$ and $\theta_{HS} > HS$. If both $\theta_{IS} = IS$ and $\theta_{HS} = HS$ then sectoral labour productivity is maximized. In that case the output elasticties with respect to intermediate-skilled labour (equation B.7) and highly-skilled labour (equation B.8), and the respective marginal productivities of intermediate-skilled labour, $d(Y/L)/dIS$, and highly-skilled labour, $d(Y/L)/dHS$, are zero. Thus, in the Cobb-Douglas form of the effective labour input, there are opportunities for increasing the labour productivity of a sector if the effects[16] of intermediate and highly-skilled labour on the sectoral labour productivity are larger than the employment share of intermediate and highly-skilled labour, respectively. However, the neoclassical theory of production assumes profit maximization rather than the maximization of labour productivity. To maximize profits with perfectly competitive labour and product markets, the marginal productivities of intermediate and highly-skilled workers have to be equal to the respective real wages. If firms have monopsonistic power on the labour market and/or monopolistic power in the product market, marginal productivity exceeds real wages. Therefore the marginal productivities of both intermediate and highly-skilled labour and the respective output elasticities, i.e. equations (B.7) and (B.8), should be positive. These are necessary conditions for profit maximization, which are satisfied if both $\theta_{IS} > IS$ and $\theta_{HS} > HS$.

Next, the diffusion and the research effect on the productivity growth of a sector are modelled. The two effects are incorporated in the production function of equation (B.5) through the efficiency parameter A_t, which indicates the level of technology actually employed in production (Nelson and Phelps, 1966) at time *t*. Equation (B.9) results if equation (B.6) is rewritten and stated in growth terms. The dots indicate that the variables are denoted in growth terms (first derivatives of natural logarithms). The equation shows that the total factor productivity growth is the difference between the growth of the value added per worker and the growth of the input factors (including the average firm size).

$$\dot{A}_t = (\frac{\dot{Y}}{L_t}) - \alpha(\frac{\dot{K}}{L_t}) - (\alpha+\beta-1)\,Lbarsubt - \beta(1-\theta_{IS}-\theta_{HS})(1-IS-HS)_t - \beta\theta_{IS}\dot{IS}_t - \beta\theta_{HS}\dot{HS}_t \tag{B.9}$$

The efficiency parameter A_t can be modeled as follows (see e.g. Nelson and Phelps, 1966).

$$A_t = A_0 e^{gt} \tag{B.10}$$

In the above equation, *g* represents the rate of increase in the efficiency parameter and A_0 represents the initial efficiency level. The next equation is obtained by taking the natural logarithm of equation (B.10) and differentiating the equation to *t*.

$$\frac{d\ln A_t}{dt} = \dot{A}_t = g \tag{B.11}$$

It follows that the total factor productivity of a sector grows at rate *g*. It can be argued that both the diffusion and the research effect of human capital directly affect the level of technology that is actually used in production, i.e. the efficiency parameter A_t (see Section 2 and Wood, 1995). Moreover, based on the discussion of human capital effects in Section 2, it can be hypothesized that the input *level* of human capital in a sector relative to the input levels of human capital of the competing sectors in other countries explains the *growth* of total factor productivity, *g*, of the equation (B.11). In other words, the diffusion effect and the research effect of the relative human capital levels (relative to other sectors, see below) on productivity growth are due to quickly adapting to new production techniques and developing new technological knowledge, respectively. The diffusion of new production techniques takes place from competing sectors in other countries (diffusion of sector-specific best-practices). It is assumed that

---

[16] As has been argued above, these effects consist of both the worker and the allocative effect.

the diffusion of technological knowledge is positively dependent on the relative human capital level of sectors between the same sectors of different countries. The relative human capital level of a sector increases if the employment share of intermediate or highly-skilled labour of the particular sector relative to the all-country average sectoral employment share of intermediate or highly-skilled labour increases (*ISREL* and *HSREL*, respectively). Intermediate and highly-skilled workers probably are, in contrast to low-skilled workers, most able to introduce and apply new technological developments. Moreover, research and development (R&D) activities particularly require the input of specialized and skilled R&D workers (NOWT, 1994; Berendsen et al., 1995). These workers contribute directly to the level of technological knowledge of the sector. Since R&D expenditure consists mainly of wage costs of R&D workers (NOWT, 1994), the input of R&D workers can be approximated by the sector's ratio of research and development expenditures to value added. To estimate the impact of the technological gap between the same sectors of different countries on productivity growth, this ratio is divided by the all-country average R&D to value added ratio of the same sectors in other countries, i.e. the relative R&D intensity (*RDREL*).[17] Explaining the total factor productivity growth of a sector by the combined diffusion and the research effect results in the following equation (see for a similar equation Leiponen, 1995).

$$g = \gamma_{IS} ISREL + \gamma_{HS} HSREL + \gamma_{RD} RDREL \qquad \text{(B.12)}$$

The diffusion effect of intermediate and highly-skilled workers is represented by γ_{IS} and γ_{HS}, respectively. Moreover, the research effect of skilled R&D workers is represented by γ_{RD}. The above equation is suited to estimating the diffusion and research effect of human capital on the productivity growth of sectors.

APPENDIX C: TECHNICAL DETAILS AND OTHER ESTIMATION RESULTS

With respect to estimating the capital elasticities of output the skill-based classification is not applicable. Therefore the capital elasticities of output are assumed to be equal within the categories of the low, medium and high capital intensive sectors. This classification is based on the fixed capital stock per worker and is included in Appendix A of this paper (table A.1). This classification indeed appears to be different from the skill-based classification presented in table 1. The capital elasticity of the high capital intensive sectors (food, beverages and tobacco, paper and printing, basic metals, non-metallic minerals) is expected to be the largest, followed by the capital elasticity of the medium capital intensive sectors (rubber and plastic, electrical machinery and transport equipment) and the capital elasticity of the low capital intensive sectors (textiles, apparel and leather, wood, metal products, non-electrical machinery, professional goods). Additionally, the elasticities of output with respect to the average firm size for the medium firm size sectors (chemicals, electrical machinery) and the large firm size sectors (basic metals, transport equipment) may differ from the other sectors (see table A.1).

Least squares regressions are applied to equation (B.6) in a dummy variable model (see for example Judge et al., 1985 and Gujarati, 1988).[18] Since the model of this chapter only analyses the impact of sector-specific variables on sectoral labour productivity, country-specific dummy variables are incorporated to allow for country-specific differences in labour productivity.[19] Table C.1 presents the estimation results of equation (B.6) for 1988 and 1991, respectively, that are not presented in Section 4.[20]

Total factor productivity growth, *g*, is found by use of equation (B.10). The variables included in equation (B.10) are the average annual growth rates between 1988 and 1991 of the same factor input variables as specified in the regression analysis of equation (B.6) above, i.e. sectoral labour productivity growth, capital intensity growth and the growth rates of the employment shares of intermediate and highly-skilled workers.[21] Total factor productivity growth of each sector is calculated by substituting the estimated 1988 parameters of table 3 and the growth rates of the factor input variables mentioned above into equation (B.10).

---

[17] See e.g. Mayes et al. (1990) for the importance of relative R&D expenditures for trade performance.

[18] Since the coefficients of capital intensity, average firm size and the shares of low, intermediate and highly-skilled labour are constrained as shown by equation (B.6), non-linear least squares regression is applied to estimate the coefficients of equation (B.6) directly. Note that α and β are also restricted.

[19] The single-equation estimations of this paper may suffer from the simultaneous equation bias, due to which the estimators are biased and inconsistent (see for a discussion Intriligator 1978). However, as is shown by, for example, Hoch (1962) and Zellner et al. (1966), specific characteristics of the disturbance term of the single equation (e.g. that the disturbance term is not correlated with the explanatory variables) justifies single equation regression.

[20] See Appendix A for a description of the data sources. The results of the estimations for 1989 and 1990 do not in general differ very much from the 1988 and 1991 results.

[21] However, the growth of the average firm size is excluded, since this variable is only available for 1988 and is assumed not to change over the estimation period. Due to not including the average firm size variable, the French manufacturing sectors could be included into the regression analysis of equation (B.12).

Table C.1

Other estimation results of equation (B.6), 1988, 1991

	$\hat{\alpha}$	$(\alpha + \hat{\beta} - 1)$	$\hat{\beta}$
1988			
high-skill sectors			
chemicals	0.28 (3.30)^{c}	0.16 (2.78)^{c}	0.88
electrical machinery	0.27 (2.95)^{c}	0.16 (2.78)^{c}	0.89
professional goods	0.25 (2.75)^{c}	0.19 (3.13)^{c}	0.94
non-electrical machinery	0.25 (2.75)^{c}	0.19 (3.13)^{c}	0.94
medium-skill sectors			
paper and printing	0.27 (2.95)^{c}	0.19 (3.13)^{c}	0.92
basic metals	0.28 (3.30)^{c}	0.12 (2.71)^{c}	0.84
transport equipment	0.27 (2.95)^{c}	0.12 (2.71)^{c}	0.85
low-skill sectors			
rubber and plastic	0.27 (2.95)^{c}	0.19 (3.13)^{c}	0.92
metal products	0.25 (2.75)^{c}	0.19 (3.13)^{c}	0.94
non-metallic minerals	0.28 (3.30)^{c}	0.19 (3.13)^{c}	0.91
food, beverages and tobacco	0.28 (3.30)^{c}	0.19 (3.13)^{c}	0.91
textiles, apparel and leather	0.25 (2.75)^{c}	0.19 (3.13)^{c}	0.94
wood	0.25 (2.75)^{c}	0.19 (3.13)^{c}	0.94
country dummies			
C (NLD*)	7.58 (7.31)^{c}		
DUMBEL	0.36 (3.08)^{c}		
DUMDEU	−0.21 (1.93)^{a}		
DUMDNK	−0.31 (2.82)^{c}		
DUMESP	0.73 (4.08)^{c}		
DUMGBR	0.35 (2.51)^{b}		

(continues overleaf)

Table C.1 (continued)

Other estimation results of equation (B.6), 1988, 1991

	$\hat{\alpha}$	$(\alpha + \hat{\beta} - 1)$	$\hat{\beta}$
1991			
high-skill sectors			
chemicals	0.34 (3.49)^c	0.10 (1.54)	0.76
electrical machinery	0.33 (3.17)^c	0.10 (1.54)	0.77
professional goods	0.31 (3.05)^c	0.15 (2.19)^b	0.84
non-electrical machinery	0.31 (3.05)^c	0.15 (2.19)^b	0.84
medium-skill sectors			
paper and printing	0.33 (3.17)^c	0.15 (2.19)^b	0.82
basic metals	0.34 (3.49)^c	0.10 (1.91)^a	0.76
transport equipment	0.33 (3.17)^c	0.10 (1.91)^a	0.77
low-skill sectors			
rubber and plastic	0.33 (3.17)^c	0.15 (2.19)^b	0.82
metal products	0.31 (3.05)^c	0.15 (2.19)^b	0.84
non-metallic minerals	0.34 (3.49)^c	0.15 (2.19)^b	0.81
food, beverages and tobacco	0.34 (3.49)^c	0.15 (2.19)^b	0.81
textile, apparel and leather	0.31 (3.05)^c	0.15 (2.19)^b	0.84
wood	0.31 (3.05)^c	0.15 (2.19)^b	0.84
country dummies			
C (NLD*)	7.19 (6.00)^c		
DUMBEL	0.24 (1.98)^b		
DUMDEU	-0.16 (1.02)		
DUMDNK	-0.34 (3.09)^c		
DUMESP	0.56 (3.32)^c		
DUMGBR	0.29 (2.08)^b		

* The Netherlands is the reference country; *C* represents the constant term;

BEL: Belgium, DEU: Germany, DNK: Denmark, ESP: Spain, GBR: Great Britain

Notes: The labour elasticities of output ($\hat{\beta}$) are calculated from the previous two columns. The sectors are ranked according to the all-country average employment share of highly-skilled workers (see table 1). See table 2 for the abbreviations of the countries. The absolute t-values are between brackets. The superscripts *a*, *b* and *c* indicate a significant coefficient at the 10%, 5% and 1% level, respectively.

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THE FUTURE OF WORK AND SKILLS - VISIONS, TRENDS AND FORECASTS

Manfred TESSARING (CEDEFOP)

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The processes of European integration, the disruption in labour markets and the transformation of economies mark ongoing structural changes of the socio-economic framework. The underlying forces are usually identified as the globalisation of markets, increasing importance of information, new technologies and international competition. Before this background, discussion increasingly focuses on the future of work and skills.

This paper will discuss some major trends concerning the restructuring of economies and social change in Europe. It will focus on the impacts on work and jobs and, above all, on qualifications and skills needed in the future. The discussion cannot, however, be limited to quantitative or structural forecasts. It has also to take account of the changing nature of and the values assigned to work and skills - both from the individual and the enterprise perspective.

1. STRUCTURAL CHANGE

1.1 The changing nature of work

The distinction between "necessary" labour and "useful" work is deeply rooted in Occidental history and culture *(box)*. In her profound historic and philosophic review Arendt (1958/1981) analysed the roots of the valuation of work from the early Graeco-Roman times and Christianity up to nowadays pointing to the trichotonomy between "labour" for securing subsistence, "work" for creating values and "acting" politically in a broader sense.

These antitheses are not offset up to our contemporary societies although their economic and social references have continually been changing over time. This becomes, for example, visible by the distinction between "blue collar work" or shopfloor working on the one hand and "white collar work" on the other; the historic roots also may explain the imparity of esteem of practical training and general/theoretical education (Robinson 1997) widely discussed since long.

The industrialisation process brought about, in its first and second stage, an increasing division of labour within and between enterprises, accompanied by the automation of manual work (Fordism/Taylorism). Main forces were the increase of work productivity, the use of science and technology, the qualification of the workforce and an efficient organisation of work. Industrialisation also resulted in a growing welfare and social security of the working classes. However, as sociologists have pointed out, this process was accompanied by alienation and polarisation of work. Schelsky (1975) even saw an increasing drift between executive workers ("Ausführende") and managers respectively the academic elites ("Disponierende").

In recent times, the restructuring of production concepts and work organisation, the globalisation of economies and the increased use of new technologies - in particular Information and Communication Technologies (ICTs) - led to fears that societies run out of labour with only highly qualified workers being needed and a growing part of the (lower skilled) working population being surplus or at disposal for temporary work and precarious jobs. Others, however, point to chances for a new role and quality of work in post-industrial societies characterised by self-responsible performance of tasks, group-working and autonomy of workers. In this process, qualification and skills should become increasingly necessary for coping with changed requirements of jobs.

Thus, present industrial or post-industrial societies are facing a paradox: on the one hand high and persisting unemployment, unstable jobs and a depreciation of skills ("over-education", "underutilisation"), on the other rising skill requirements and the importance of "human capital" as a decisive factor for economic growth and competitiveness. Predictions on the future of work and skills thus range from those which predict "jobless growth and societies" to those which point to a radical change in the nature of work and skills in the decades to come.[1]

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[1] For a comprehensive discussion cf. for example: Beckenbach/Treeck 1994; Bengtsson 1993; Birnbacher/Dostal 1990; Carpedeville/Heran/Politanski 1992; Green/Steedman 1997; Schulte 1996; OECD 1994a; Prognos 1996; Rifkin 1995; Volkholz 1992.

Etymology and definitions of "labour and work"

Preserving human existence by "necessary labour" and creating values by "work" is deeply rooted in Occidental history, religion and culture. All European languages - living and dead ones - have two etymologically total different words for "labo(u)r" and "work". It is significant for Occidental history, religion and culture that *labor* originally signifies pains and burden, whereas *work* had the meaning of creation, manufacture, utility - although, however, the social and economic background has been changing.

- Ancient Greek distinguishes between *πόνος (pónos)* and *έργον (érgon)*. *πόνος* (labor, pains) is one of the evils out of Pandora's box, whereas *έργον* (work) is due to the goddess of wholesome dispute and quarrel, Eris (cf. Hesiod, Tage und Werke 20-26); Greek *πενία* (pénia = poverty) and *ποινέ* (poiné, cf. Latin poena ="pains", "penalty" and German "Pein") have the same origin as *πόνος*.
- Latin distinguishes between *laborare* and *facere* or *fabricare* (same origin). *Laborare* has the original meaning "staggering under a burden". *Facere* has the sense of "productive manufacturing/making" (Greek translation: *τέχτων (téchton)*, cf. also French: *faire*).
- French distinguishes between *travailler* and *ouvrer*, while *travailler* has replaced the older word *labourer*. *Travailler* itself is derived from Latin *"tripalium"*, a special kind of torture.
- English distinguishes between *labour* and *work*. *Labour* is cognate with Latin *laborare* (op. mentioned) and *work* with old Germanic *werc(h)*, which is related to Greek *érgon* (op. mentioned); all these words have the probable original meaning of "weaving, surrounding/blocking off with basketwork" and belong to the indogermanic root **uer-* "to twist, to bend, to weave".
- German distinguishes between *arbeiten* und *werken*. *Arbeiten* (cf. the Slavic *robota* and the old English word *earfode)* is probably derived from the old Germanic root *arbm-* (coming from Indogermanic **orbho-s* = orphan) and denotes "abandoned, orphaned, a child put to hard physical service". For the meaning of *werken* cf. the above mentioned English origin of *work*.

(sources: Arendt 1981, pp. 327, 333, 334, 346; Duden "Etymologie", 1989)

Definitions of "labour" and "work" in philosophy and sociology mirror these origins. Some examples are:

- "Labour" of the "animal laborans" - as an existential necessity for the subsistence of mankind - *(Arendt)* is contrasted to the making of "works". *Marx* defined "necessary labour" as an activity to mediate the exchange between man and nature, independently from the form of society. He contrasted necessary labour to concrete "useful" work, which aims at an environment assimilated to man as well as includes the utopia of an emancipation from the daily struggle for survival (and from 'necessary labour').
- Work is a specific performance which is goal-directed and future oriented, and aims at the fabrication of works useful for human application; or as an activity by which disorder is transformed to order (*Georgescu-Rocgen* 1971; *Serres* 1981)
- Work is a central societal practice which is characterised by direct co-operation as well as by division of labour (*Brock* 1994, S. 260)
- Work is a means to derive and secure an income, social recognition and validation and as a central means of life experience, necessary for the forming of a self-conscious personality, of individual identity and to define its location within society (*Marcuse 1965*).

Without discussing these aspects exhaustively, some "megatrends" which apply to most contemporary societies affecting future working life should be mentioned:[2]

- decrease in working time, more flexible working time;
- growing importance of services, information, knowledge and skills;
- increasing participation in education and training, and - particularly true for women - in work; increasing qualification of the populations;
- relocalisation of production and work, globalisation of the economies and changing organisation of work and production;
- increased international competition and diffusion of new technologies;
- ageing of populations in particular at working age;
- persisting gaps between labour supply and demand (unemployment) as well as between available and required skills (over-/undereducation, structural unemployment);
- increasing selection and danger of social exclusion of low qualified workers or other disadvantaged;
- changes in the values towards work and erosion of the traditional homogeneity of life biographies, career paths and social milieus.

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[2] Cf. for further discussion: Klauder 1990; Franke/Buttler 1991; Naisbitt 1992; European Commission 1993.

1.2 Innovation, services and knowledge

Among the various theories to explain structural change (cf. for an overview: Feldmann 1993), there are basically two that have apparently been confirmed so far.

- The Schumpeterian theory of economic cycles (Schumpeter 1954, 1961) and, based on it, the theory of economic evolution (Nelson/Winter 1982) explicitly stress the role of innovation and of pioneer entrepreneurship as the main forces for the economic progress of a country.
- The theories of a post-industrial society (Touraine 1969, Bell 1973, Gershuny 1978), based on Fourastiés theory of the Three Sectors (Fourastié 1949), predict a long-term increase in production and employment in the services sectors.

Closely related and based on these theories are those which expect the transition to an information, knowledge-based and learning society as for example the European Commission in its White Paper on "Teaching and learning - towards the Learning Society" (1995a) and the European Commission/OECD in its reader on "The economics of the Information Society" (Dumort/Dryden 1997).

There is strong evidence for these theories:

The "Meta-study" carried out for Germany by renowned research institutes during the 1980s concluded that innovation prevents growth in unemployment by improving the competitiveness of firms. Increased unemployment growth would be unavoidable, however, in case of a lower level of innovation. The same has been confirmed by numerous studies on innovation and new technologies, e.g. the OECD jobs studies (1994, 1995, 1996).

Secondly, the service sector's share of employment has significantly increased in industrialised countries *(figure 1)*. Moreover, services were the only sectors with employment gains in most countries and thus give rise to optimistic expectations for the future. Similarly, OECD analyses reveal, of all the sectors of the economy, services are the heaviest users of technology and are the most prosperous sectors in terms of growth and employment (Papaconstantinou 1996, 1997). The OECD points out, in particular in its 'jobs studies', that in the past job losses have occurred mainly in the low-technology, labour-intensive part of manufacturing, whereas the main sectors for employment growth have been the services and a few technologically sophisticated and science-based manufacturing industries. It is the knowledge-intensive sectors which have been expanding their employment more rapidly than the rest of the economy (Papaconstantinou 1995).

When speaking of services, it should be noted that they refer not only to "industrial sectors" as a classification category. A substantial and increasing number of jobs, even in manufacturing, have a service character. They are related to, among other things, management, organisation, accounting, data processing, research and development, transport, communication, marketing and sales promotion.

Regarding the character and economic power of services, the view that most services are dependent on material production is increasingly discussed. Thus, in West Germany, the private service sectors have surpassed the manufacturing sector as regards the value added, labour productivity, the degree of modernisation of plant and equipment, and their share of employment (Tessaring 1996).

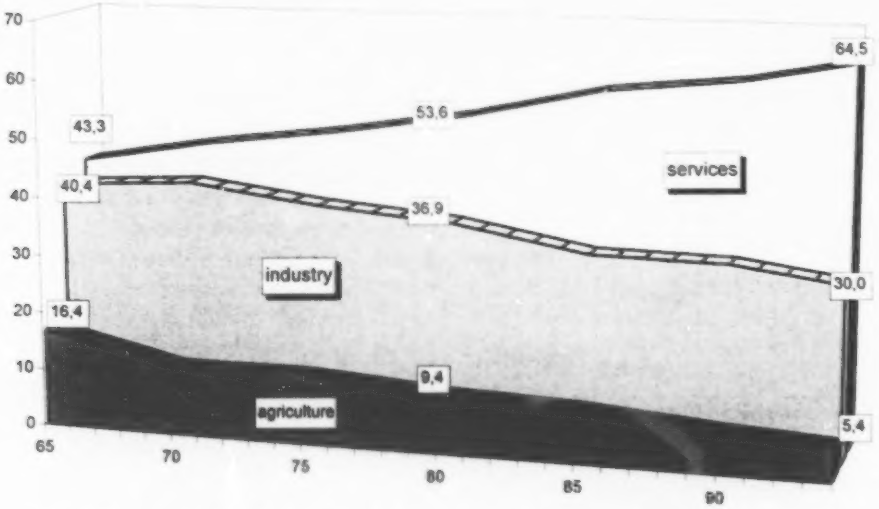
However, the optimism of the advocates of a post-industrial society expecting the generation of wealth, humanisation of work, prospering education and culture, rising qualifications and avoidance of unemployment[3], has not on the whole been realised so far. Though services were, in quantitative terms, the main providers of new jobs in the past, they could not fully compensate for the substantial job losses in the economies of most industrial countries and thus prevent the high and persistent level of unemployment and in particular long-term unemployment.

---

[3] Fourastié even expected the way towards a "tertiary civilisation" with qualified, well-paid services and social security contributing to the mental, cultural and moral development of mankind.

Figure 1:

Sectoral employment trends 1965-94 (%)*



*1965/70: EUR 10; 1970-1990: EUR12; 1994: EUR15. Civilian employment, annual averages; partly estimated by Eurostat; 1994: data for Austria not available
note that after 1970 EUR12 figures for agriculture are higher, and for industry and services lower than the trend for EUR10; EUR15 figures 1994 change the trend for EUR12 only marginally
source: EUROSTAT "Employment and unemployment", various issues

Comparison (%):	USA			Japan		
	1965	1980	1994	1965	1980	1994
Agriculture	6,3	3,6	2,9	23,5	10,4	5,8

Zinn (1993) even anticipates a "tertiary crisis", caused by structural unemployment and its negative impact on wages and demand. Moreover, in his view, essential services are approaching saturation, and alternative (new) services, in particular luxury and financial services, are limited by the wage levels of consumers.

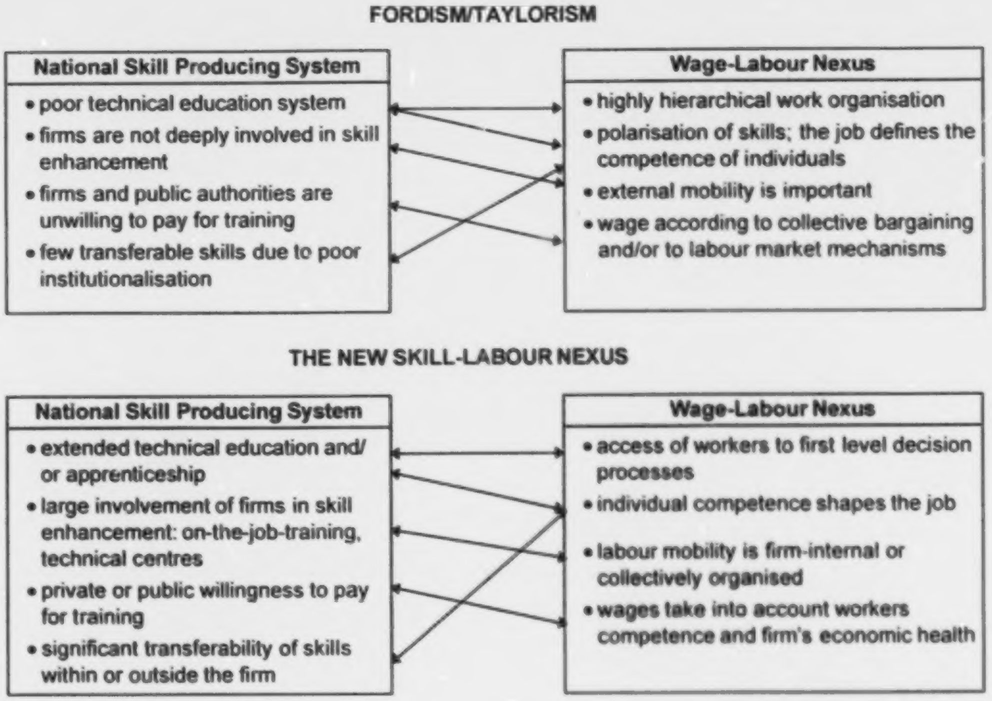
The way towards post-industrial, information-based and knowledge-based economies is accompanied by the rapid spread of new technologies and by new forms of work organisation and labour division. The tayloristic and industry concentrated era in many countries apparently is being replaced by a re-engineering of the whole business process, which is marked by:

- "new production concepts" or "systemic rationalisation" characterised by changing processes of production and of the division and organisation of work within and beyond enterprises in order to rise productivity, innovation and competitiveness;
- changing competencies and skills of workers who have a greater degree of responsibility and whose work integrates various functions in the sense of "holistic" work;
- growing importance of knowledge and information in all spheres of work and life requiring an efficient information management both for the individual and the enterprise as well as suitable measures to generate, assess and update knowledge and skills.

This process of transition form Taylorism to a new "skill-labour nexus" (Boyer/Caroli 1993) is illustrated *in figure 2*.

Figure 2:

Transition from Taylorism to a new Skill-Labour Nexus


FORDISM/TAYLORISM
National Skill Producing System
• poor technical education system
• firms are not deeply involved in skill enhancement
• firms and public authorities are unwilling to pay for training
• few transferable skills due to poor institutionalisation
Wage-Labour Nexus
• highly hierarchical work organisation
• polarisation of skills; the job defines the competence of individuals
• external mobility is important
• wage according to collective bargaining and/or to labour market mechanisms
THE NEW SKILL-LABOUR NEXUS
National Skill Producing System
• extended technical education and/ or apprenticeship
• large involvement of firms in skill enhancement: on-the-job-training, technical centres
• private or public willingness to pay for training
• significant transferability of skills within or outside the firm
Wage-Labour Nexus
• access of workers to first level decision processes
• individual competence shapes the job
• labour mobility is firm-internal or collectively organised
• wages take into account workers competence and firm's economic health

source: Boyer/Caroli 1993

1.3 Business process re-engineering

By implementing new production concepts or "systemic rationalisation" enterprises aim at a vertical integration of all production processes and a new division and organisation of work within and beyond enterprises. The main objectives are to increase competitiveness and productivity by cost reduction, by improving quality and by shortening innovation cycles. In contrast to previous modernisation activities these new strategies are not only focused on new techniques, but also on a systematic restructuring of the whole value adding process by vertical and horizontal integration.

The restructuring of the business process is decisively supported by the use of new technologies, in particular information and communication technologies (ICTs). According to Little (1996) and INFAS Sozialforschung (1996)[4] the impacts of information and ICTs - for users as well as for producers - are induced by changing strategies of firms in order to raise productivity and competitiveness and by making the most efficient use of resources, incl. human resources.

For that purpose a set of measures is being taken, such as

- new definition of the relations between relatively independent company units;
- innovation and quality assurance of products and production processes;
- ecological production and improving of working conditions;
- flattening of hierarchies and institutionalisation of group-working;

---

[4] These strategies are result of a broad enquiry among German firms, done by ZEW 1993 (cit. in infas 1996). We assume that they are likely to apply also for most firms in other industrialised countries.

- changing qualification requirements and continuing on-the-job training;
- outsourcing and out-contracting of non-core activities;
- spatial re-localisation of production and employment (locational flexibility of firms);
- fluent demarcations and strategic alliances (e.g. production networks) between several companies in the value-adding chain;
- orientation towards the customer and connecting firms with their social and political environment.

It becomes obvious that there is no uniform approach to restructuring production and work organisation across countries. A number of empirical studies point out that the "European model" of production management implies more responsibility for workers and working groups, less hierarchy and more participation, compared, for example, to the approaches prevailing in the USA or Japan (Dybowski, in this report).

Although those general characteristics are rather heterogeneous with regard to countries, regions, sectors and firms, the new challenges are supposed to lead to convergent standards of qualification and performance, too. Based on several case studies[5], Dybowski states that levels of technology in European countries are converging, due to the generalisation of knowledge and the globalisation of markets. Enterprises are increasingly forced to focus on the needs of their customers, and to produce goods of a higher quality with shorter delivery times and on schedule.

Related strategies caused a re-shaping of the production process. Firms are creating smaller and distinguishable "manufacturing isles" in order to replace tayloristic work principles with flexible and qualified team-working. The aims of the restructuring process are to reduce machining times significantly, to cut expenses for operations scheduling and CNC-programming, and to facilitate the regulation of production.

In this process, on the one hand, former vertically structured and hierarchically organised enterprise functions are being disintegrated and made partly independent. On the other hand, new monitoring and control systems, based on ICTs, are introduced in order to ensure the efficiency of production.

Furthermore, a Total Quality Management (TQM) is to implement new forms of quality assurance. TQM has not only impacts on the improvement of goods and services but also on work quality. Production workers are directly responsible for the quality of their products (zero-defect programmes) and are much more involved in problem-solving by "continuous improvement programmes". Thus, quality assurance becomes an integral part of productivity.

These activities of "business process re-engineering" (BPR) also imply changing demands on the competencies and skills of workers when taking over a broader variety of tasks and greater responsibilities. Based on new and interlinked ICTs, the modern principles underlying the organisation and regulation of production bring about changing patterns of work and human resource utilisation - apart from the question of their net employment effects.

However, they also impose contradictory elements. On the one hand they promise more self-reliant work and greater worker participation in planning and controlling the production process. On the other hand they may pose risks for work and employment. Although several studies indicate that new technologies and work organisation cannot be held responsible for high unemployment,[6] they also emphasise substantial job displacement, uncertainty and job insecurity and ever growing requirements posed on workers.

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[5] The contribution of Dybowski (in this report) refers to case studies of German automobile manufacturing and of Dutch chemical enterprises.

[6] But whose contribution to employment growth is discussed controversially, either.

2. IMPLICATIONS OF STRUCTURAL CHANGE FOR WORK AND SKILLS

The way towards a post-industrial, information and knowledge-based society is accompanied by unemployment and displacement of workers as well by the emergence of new forms of work and job contracts. Without aiming here at a comprehensive discussion of the various forms of unemployment, over-education or under-utilisation of skills and precarious jobs, and the reasons therefore, we will briefly discuss two kinds of labour market imbalances which particularly refer to qualifications and skills. These mismatches or "gaps" of job requirements and worker's qualifications are long-term unemployment and over-education.[7]

On the other hand, new and flexible work forms are emerging which may meet both the requirements of workers and enterprises. It cannot be decided in general whether and to what extent the advantages or disadvantages of these new work forms are prevailing. They may bear opportunities for a self-fulfilment of the individual and raising productivity of firms as well as risks of social exclusion and social costs.

2.1 Impacts on work and jobs

2.1.1 Unemployment

Unemployment and in particular the increase in long-term unemployment are regarded as the most crucial problems and challenges of contemporary societies. Unemployment occurs:

- if the number of available jobs falls short of the number of people who wish and are available to work (job shortage);
- or if the potential labour force exceeds the number of available jobs (supply surplus).

These definitions refer to different reasons for unemployment, although both components are responsible for present unemployment.[8] And it requires specific attention for policy makers to find appropriate and targeted measures for both, increase in jobs and labour supply oriented policy.

Without referring here to the long list of research devoted to explaining and measuring unemployment[9] one should note that unemployment (Franz 1996):

- means renunciation of income and production;
- generates high fiscal costs, either direct pr indirect material costs (expenditure e.g. on unemployment benefits and shortfalls in revenue from taxes and social insurance contributions)[10] or immaterial costs (e.g. psycho-social impacts or criminality), which are difficult to measure, however;
- impedes investment in productive and innovative areas where additional jobs may be created; this could lead to a self reinforcement of unemployment;
- increases inequality because unemployed people face greater welfare deficits as employed persons;
- causes considerable strain for the persons concerned who feel that they are no longer useful or - if they are young people - that they are being denied future prospects.

It is since long confirmed in almost all EU and other countries that there is an inverse relationship between the level of education and training on the one hand and unemployment rates on the other.[11] Reasons are processes of screening and credentialism, but also the assumed higher productivity of better qualified people. Apparently employers not only associate higher skills with specific performance capabilities, but also with the social and flexible competencies increasingly required in the course of technical progress.

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[7] We will use the term "over-education" here in a neutral sense, i.e. without deciding whether skills are higher than required at the job or whether jobs do not sufficiently utilise workers' skills.

[8] In Germany throughout the eighties, the first reason was prevalent, due to declining job numbers (Klauder 1990).

[9] Cf. for example Franz 1996 and the extensive literature given there.

[10] The White Paper of the European Commission on "Growth, competitiveness, employment" (1993) estimated the direct costs of unemployment to be ECU 210 billion in 1993, i.e. 4% of the total GDP of the Union. Not included are decreases in indirect tax revenues and social costs.

[11] See, for example, the specific unemployment rates given in OECD (Éducation at a glance, 1996) and in European Commission/Eurostat/CEDEFOP (Key data, 1997).

Most alarming is the increase of long-term unemployment[12] in all European countries. Long-term unemployment, according to a recent analysis, is a much greater problem than was assumed up to now: the share of long-term unemployed, when measured correctly, is more than twice as high as reported in official figures (Karr 1997).

It is shown using flow data that the usual measurement practice[13] under-reports the volume of long-term unemployment systematically and on a large scale. In the past ten years in West Germany, periods of unemployment lasting one year or longer constituted more than 50% of total unemployment; in 1996 it stood at 58.4%. The under-reporting of long-term unemployment is even higher in England and France; in both countries long-term unemployment at present accounts for more than 67% of total unemployment (Karr 1997).

Moreover, and according to Eurostat data, the above-average relative increase in very long-term unemployment - lasting two years or more - has risen alarmingly from around 23% to 30% among all unemployed in the past few years, with equal shares of males and females (European Commission/Eurostat: Employment in Europe 1996). This appears to be a strong confirmation of the hypotheses of hysteresis and structural unemployment: Even economic recovery with rising job numbers does apparently not solve the problem of long-term unemployment (Werner 1996).

Looking at the long-term unemployment of different skill levels, we again find that intermediate and higher educated people are less affected (Eurostat 1995a). This is true for most countries of the European Union.

2.1.2 Inappropriateness of skills

Increasing research work in Europe and elsewhere is devoted to the problem of "over-education" and "under-utilisation" indicating qualitative imbalances or "skills gaps" (cf. for example: Hartog 1997; AEA 1997; CEDEFOP 1998). They imply a "mismatch" of the contents or structures of qualifications and of jobs, which is normally not registered by official statistics. "Over-education" looks at qualifications as the point of reference whereas "under-utilisation" refers to the job. Both terms can be summarised by "inappropriateness" (of jobs or of skills).[14]

"Inappropriateness" is measured empirically by self-assessment of workers (subjective approach), or by referring to job analyses or a given distribution of qualifications in a job (objective approaches). However, they are mostly of a static character and do not sufficiently take into account changes in job requirements (e.g. owing to new technologies) and in individual skills (e.g. through experience, continuing training) over time. "Over-education" may also be a classification or aggregation artefact when using aggregate data and occupational classifications.

The interpretation of over-education raises a paradoxon concerning age and work experience. Young persons at the beginning of their occupational career are usually better educated than necessary for a specific job: this is the more the case if their education and training have prepared them for a variety of jobs and not for a specific one for which they may be "over-educated".

Thus, transferable or versatile skills tend towards "over-education" for a specific job. Older workers with a long work experience may state that they cannot make much use of their initial education and training, achieved a long time ago; but maybe without that training they might never have reached the present position.

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[12] Duration of unemployment 1 year or more.

[13] I.e. by measuring the stock of unemployed and their previous - incomplete - duration of unemployment at a certain date.

[14] Of course there are also inverse manifestations denoted as "under-education" respectively "over-utilisation".

The results for various European countries and the USA presented by CEDEFOP (1998) make it difficult to gain a clear picture of the degree of "over or under-education" in different countries and periods although they indicate a growing trend of "over-education". However, there are substantial differences, not only from country to country, but, what counts more, also between different studies made for a single country. And there are considerable variations depending on the approach used.

2.1.3 Flexible work

A flexibilisation of work and work contracting is likely to bring about both cost and efficiency gains for employers, and the choice of different life-styles for employees. To achieve continuous improvement in work performance, it is widely agreed that employees need to acquire progressive and flexible skills (communication, judgement, decisiveness, initiative and self-management) that can improve their competencies outside their current organisation, too. With the employer-employee relationship becoming more flexible job security is diminishing. There is a clear downside risk that the traditional tenure-based sources of skill may be weakening.

As a consequence, flexible rather than bureaucratic careers are expected to become prevalent. Flexible careers involve frequent job changes. "For the workers involved, the aim is to gain incremental progression with each move. ... An inevitable feature...is that they are inherently insecure. It is no longer a question of gaining access to a superior job, but of maintaining one's 'employability', of keeping fit in both the internal and external labour market for jobs through the acquisition of externally validated credentials." (Brown 1995, p.36) He predicts that this "will place an even greater emphasis on access to initial 'fast-track' training programmes in order to climb truncated corporate career ladders and to obtain a 'value added' curriculum vitae." (p. 37)

2.1.4 New forms of work

The new forms of jobs and work contracts emerging in industrialised countries *(box)* indicate that the "normal" standard employment contracts and occupational careers face erosion. Whether these new types of 'flexible' jobs which reflect the complexity and uncertainty - but also the dynamics - of our economies and social environment are desirable or not, and for whom[15], cannot be generalised. Most of these new forms of work are located in a continuum between regular and irregular contracts and, depending on the individual situation, may have advantages and disadvantages at the same time. Much more detailed analyses are necessary in this field.

Thus "untypical jobs" should not be equated with "precarious jobs" without further analysis. Untypical jobs could also indicate new and promising forms of employment, if they correspond to individual preferences and future-oriented work. Important criteria for deciding whether a job is precarious or not, could be voluntariness, reversible options, threat of unemployment or inappropriate employment, exclusion from careers, promotion, further training opportunities, social security, etc.

Typology of new jobs and job contracts

Job contracts related to working time: part-time work; reduction of daily, weekly, annual, lifetime working time; flexible working time; "stand-by work"; shift-working; job rotation and secondment; exemption from work for family, care, further training or labour-market reasons; sabbatical year; temporary work; fixed-term contracts; seasonal work; flexible retirement schemes.

Contracts related to the location of jobs: teleworking; extra-company work; home-working; agency workers.

Jobs related to the work status: "quasi self-employment"; contract for services or for work; work as family members; informal work; do-it-yourself work; honorary work; jobs not covered by social security; illegal (shadow or clandestine) work.

Multiple job holders, 'moonlighting', sideline activities (e.g. counselling, official duties, boardroom duties).

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[15] It should be noted that individual desirability or advantage does not always correspond to social desirability.

In the following, some selected empirical findings will be discussed briefly.

Fixed-term contracts or temporary jobs form a considerable proportion of total EU employment, in 1995 around 12% of all jobs. A high proportion of jobs newly created in 1995 were temporary ones, and more than 50% of the unemployed who found a job were offered a fixed-term contract (European Commission/Eurostat: Employment in Europe 1996).

Furthermore, the Community Labour Force Survey 1994 (Eurostat 1995) reveals that fixed-term contracts are much more frequent among less qualified workers (9.5%) and higher qualified workers (9%) than among those with an intermediate level of education and training (6%), and the proportion decreases as the age of workers increases. But the differences between countries are enormous. For workers with intermediate skill levels, the proportion of fixed-term contracts ranges from 1.5% (Luxembourg) to 23% (Spain).

The *Ad Hoc* Labour Market Survey 1994 (European Commission 1995b) confirms these results on the whole, although the country-specific results differ somewhat from the Eurostat data presented above.[16] Some results are:

- females tend to be more likely to be employed on a fixed-term contract basis than males;
- the average duration of fixed-term contracts in the EU is 12 months;
- the survey also compares actual part-time and full-time work with the working time preferences of workers and the unemployed. On the whole, 34% of the unemployed would prefer part-time work, and 13% of full-time workers would change over to part-time work. On the other hand, however, 33% of part-time workers would like a full-time job, thus the net balance for employment redistribution remains open;
- *self-employment* in Europe has remained more or less constant over the past 20 years at around 15-16% (male: around 19%, female around 10%). Countries with an above average proportion (>20%) were Greece, Portugal, Italy, Ireland and Spain, in particular because of the greater importance of agriculture in these countries. A number of countries regard self-employment as one means of reducing unemployment, and offer financial support and advice and training courses on becoming self-employed.

Quasi self-employment exists if the worker - although formally self-employed - is more or less de facto dependent on one enterprise (for economic, contractual and other reasons). An empirical survey for Germany analyses the scope of "quasi-self-employment" according to different criteria (e.g. personal dependency, integration into the organisation of the principal, entrepreneurial risk, compulsory insurance and social security contributions).

The results show that the quasi-self employment is located within a grey area which covers 3.2% of the total labour force. Within this grey area, 0.6% to 1.4% of the labour force - depending on the criteria used - can be unambiguously defined as "quasi self-employed" (Dietrich 1997).

2.2 Skill needs in "information and knowledge-based societies"

Work processes are not only a "metabolic process" with Nature but they also produce knowledge. There seems to be a growing separation of performing practical work and information-processing work, a separation of manual work and brain work. "Information" according to Foray/Cowan (1997) requires codification, e.g. the conversion of knowledge into messages, which can be then processed as information. Thus, information and knowledge are two sides of the same coin and give rise to one another.

These processes are decisively supported by ICTs which facilitate the development of networking and the integration of different information systems. Thus, in the information society both processes merge: the computerisation and "informatisation" of work on the one hand, and, on the other hand, the emergence of systemic production methods based on new technologies which are at the same time the basis of a new social formation and a new shaping of work.

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[16] Among else due to the limitation of the Ad Hoc Survey on industry and retail trade (for details cf. European Commission 1995b).

These processes lead, according to Boes et al. (1995), to basic shifts in the trends of individual work:

- information work is and will increasingly be of importance both to suppliers and users of information, and in all spheres of society;
- work becomes increasingly reflexive. Information on the one hand enables to observe and improve work in relation to its aims, quality and efficiency; and on the other hand to relate individual contributions to those of others. This requires a new specific - not necessarily occupational - identity;
- specific competencies and occupations will be under increasing pressure to adapt.

Thus, there are promising opportunities to enhance skills and work in the context of modern production and work organisation. They may increase the upgrading of work by increasing workers' autonomy and expertise.

2.2.1 Flexible and transferable skills

A major reason for the positive complementarity between skills and ICTs is that the role of information processing and of the flexibility of workers is becoming crucial in the production process. This feature of new technologies has already been pointed out by Ryan (1987).

Since then, a substantial body of studies has been carried out which definitely confirm this trend. Capital equipment tends to become more fragile, so that workers must be able to cope rapidly with a wide range of unforeseen difficulties arising in the production process. Moreover, workers must be able to handle the increasing amount of information processed in the production activity as well as to take initiatives in order to adapt the production process to an increasingly unstable demand. This requires from them a high degree of versatility.

Similarly, Colardyn/Durand-Drouhin (1995) point out that most jobs require a multiplicity of skills, ranging from physical abilities to cognitive skills (e.g. analytical and synthetic reasoning, numerical and verbal abilities) and interpersonal skills (leadership, supervision, team work).

"Many studies have concluded that...computer-based new technologies tend to require lower standards of traditional skills and higher abstract and synthetic reasoning abilities. They thus seem to both increase the skill content and the share of high-skill jobs in economies, leading to an upgrading of skill requirements for the workforce as a whole." (Papaconstantinou 1995, p. 9)

The direct consequence of this is that workers - either white or blue-collar - need highly transferable skills together with a good educational level. Given the rapid pace of technical and economic change, they may be forced into changing activities and jobs several times in the course of their working life. A solid educational and training background will help them adapt to new requirements.

2.2.2 Impacts of new technologies on skills

Since an increase of firms' innovative capability and flexibility can only be realised through a changing deployment policy, work receives a new strategic function to secure the continuity of the production process and to an efficient use of complex production plant (Schumann et al. 1994).

In view of the impacts of technology and innovation on human resources, priority is accorded to multiple skills, comprising education, training and experience, as well as the ability to communicate and work in relatively unstructured situations. The same process of increased functional and extra-functional competencies, however, may lead to a depreciation of the traditional skilled worker at the intermediate level, since it requires both practical experience with machines and material and theoretical knowledge of the principles of the production process ("production intelligence"). They can be defined as holistic qualifications and skills, the overcoming of traditional occupational demarcations - unless these occupations are not adopted appropriately - and the combination of specialised abilities with methodological and social skills.

The impacts of new technologies on employment, job requirements and skills is a complex set of relationships. There seems to be "a direct relationship between 'upskilling' and technical change: industries which invested more in research and were more innovative tend to acquire more human capital... (Therefore,) policies to promote technology diffusion should be co-ordinated with those that promote the development of adequate human capital." (Papaconstantinou 1997, p. 8f.)

The improvements in the means of communication made possible by the development of ICTs tend to facilitate the internationalisation of production. A large part of activities requiring unskilled labour[17] can be relocated from industrialised tc developing countries. As a consequence, firms' skill requirements tend to rise.[18]

The new conditions of production, group-working and reorganisation of work, may increase the autonomy and expertise of workers. But they may also cause problems if the systems of remuneration and gratification do not allow for different performances and qualifications within the group. In this case the integrative effects of team-working may become inefficient and the motivations and incentives of the main performers of a group may sink (Strötgen 1993).

Computer-based technologies bring about a change in work and require multiple skills and competencies of workers. These are characterised by a higher degree of flexibility, enhanced qualifications to manage the instalment and starting up of machinery, to operate flexible control systems as well as skills for their regulation, monitoring, attendance and maintenance. Traditional work areas such as mechanics, hydraulics, pneumatics, electrical equipment have to be complemented by new fields of competence, such as electronics, control techniques and technical organisation.

Thus, an emerging condition for work in computer-based manufacturing is enlargement of specialised skills by competence in additional disciplines, e.g. mechanical and electrical engineering, electronics, data processing and industrial engineering.

In view of the fast-moving specialised knowledge, "extra-functional", "generic" or key competencies and skills are increasingly important for the modernisation process. They include personal abilities (e.g. inclination to learn, overarching and coherent reasoning, communication skills and capacity for confrontation). Together with specific skills, these competencies constitute a higher degree of powers of initiative as an essential precondition for group-oriented work and process regulation.

2.2.3 Training for experience-led working

High-tech manufacturing tends to replace human work - including various regulation and control functions - by technical systems. However, there are limits to the automation of manufacturing processes beyond which human work cannot be replaced. On the contrary: the human element becomes increasingly important for the smooth running of technical plants. A competent intervention of workers and experience-led action is to avoid malfunctions and accidents and to include preventive maintenance.

The reason for the growing importance of human work is that concrete production processes cannot be predetermined totally in practice. High-tech processes become more fragile and in daily practice are subject to imponderables resulting from the quality of materials and processes, the condition of technical equipment and external influences (e.g. power cuts, goods delivery, etc.).

The required qualifications to prevent and manage those imponderables is experience-led working (Dybowski, in this report; cf. also Drake 1995). They include skills such as associative reasoning, complex sensory perception and a "feeling" for technical equipment. In addition, an efficient reaction to technical or computer malfunctions requires a good capacity to synthesize as well as the ability to communicate with peers in order to assess the origin of the breakdown. These are competencies, which are normally acquired only through long work experience.

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[17] But partly specific higher skills, too.

[18] However, whether absolute employment will rise as well is a controversial question.

New forms of training, including "experience making" thus gain in importance in vocational training and further training, but also require new learning arrangements (Dybowski, in this report). Approaches to experience learning aim at the simulation of practical production and administration procedures, e.g. by implementing "learning isles" and "learning stations" within production.

The self-learning capacity and experience-making are systematically promoted by appropriate teaching methods and aids. Basic experience conditions such as perception, conscious use of standards, sensitivity, attention to situations which require evaluation, etc. should be trained. These teaching concepts also include methods of purposively acquiring and evaluating experience.

3. THE CHANGING NATURE OF WORK AND SKILLS

3.1 Values assigned to work

In contrast to the utopias of work and society in the past, and to attempts to find laws and regular patterns in the change of socio-economic structures and the nature of work, the current process is a dynamism of increasing openness, uncertainty, complexity and acceleration, with multiple and interlocked problems facing advanced industrial societies.

There seem to be tendencies that erode the traditional cultural patterns of an individual's life-style as well as the value assigned to work. However, predictions that (paid) work would be of diminishing importance in individual orientations apparently proved not to be true by and large; people's real living conditions, their hopes and fears, indicate that socially validated work which shapes the individual's identity and sense of self-worth (Marcuse 1965) has not been subject to decisive depreciation over recent decades (Negt 1995; Lutz/Voss 1993).

What seems to be changing, however, is the traditional values the skilled worker assigns to work, his patterns of motivation and his life orientations. Caused by the erosion of homogeneity and coherence in his traditional milieu on the one hand, and encouraged by increasing salaries and wealth, social security and opportunities for education and training on the other, his expectations of work have become different. They are much more focused on the conditions, recognition and gratification of work, on self-determination and towards work in demanding, future-oriented jobs.

This change described by Lutz/Voss (1993) as the "dissemination of middle-class ideals of life in the working classes" results in a more conscious and rational planning of individual life and career and, consequently, in a choice of those education and training courses which promise best to achieve these goals.

It is assumed that these processes of individualisation go hand in hand with changing structures of the post-industrial society, with the spread of new technologies and new forms of work organisation and labour division both within and between enterprises.

In so far as "individualisation" is defined as an increasing singularisation of individual subjects and their biographies, however, some critics state that individualisation is not necessarily connected with subjectivity. Case studies for four countries show that - for technical workers and in view of the competition with elite groups - attempts to secure a certain status, the putting through of defined and standardised entry wages and careers and the rejection of individualised recruitment practices in the phase of job entry, demonstrate a collective consciousness in order to introduce and stabilise a new category of workers (Drexel 1994).

3.2 Credentialism and social exclusion

Work is still, and increasingly, associated with the social status of the individual. Workers who do not fulfil the increasing requirements and do not pass the filters of the selection process on the labour market because of lacking or inappropriate qualifications or because of the obsolescence of their qualifications (e.g. caused by long absence from the labour market, and in particular long-term unemployment), are in danger of being socially excluded or marginalised.

The theory of "social closure" is founded upon Neo-Weberian sociology and developed by Parkin (1979), Murphy (1988) and Witz (1992). "Credentialism is a form of closure designed to control and monitor entry to key positions in the division of labour" (Parkin 1979, p.47 f.).

In contrast to the human capital theory and pointing to imperfect information in the labour market, credentialist and screening theories (cf. for a critical review: Blaug 1985) suggest that initial training is not so much an investment which can increase human capital, but rather that success in training (as proved by certification), can act as a means of disclosing hidden information as to workers' productive potential. Both theories, credentialism and screening, refer to the selective role of education for the distribution of social positions.

Advocates of the *screening theory* deny any link between wages and the evolution in the supply of skills on the one hand, and the skill requirements of new technologies on the other hand. According to them, firms do hire people with high educational levels and pay them more, but this is not due to any positive influence of skills on workers' productive performances. What happens is that firms do not know workers' productivity at the time they hire them. So, they use their educational level or training achievement as a "signal" of their potential efficiency. Thus, according to screening theorists, education has the function of a filter, whereas its impact on productivity is most uncertain. This causes the observed upskilling of the labour force and may signify "over-education" if it does not meet the economic demand for higher skills.

Similar reasoning has led the *credentialists* (e.g. Arrow 1973, Spence 1973, Collins 1979) to argue that it is not the productivity of skills which counts, but the signals sent out by certificates. Given imperfect information on real skills, certificates and formal qualifications act as a substitute for knowledge and abilities, and thus initiate a selection process in which people with lower qualifications are sorted out.

The credentialists' view may to some extent be supported by preliminary results of analyses made for six European countries,[19] using a decomposition of demand and supply effects over a longer time period. They show that supply effects - measured as employment change for persons with different levels of formal qualification - tend to be more important than demand effects - measured as changes in the occupational structure - in explaining the rising level of qualification in these countries (Mallet 1996; Mallet et al. 1998). Whether these trends could be interpreted as credentialism or not has to be clarified by further analyses, taking into account additional variables and characteristics.[20]

However, the hypotheses of increasing credentialism and social exclusion are not generally agreed. Brown (1995) points out that the increasing demand for credentials reflects the changing nature of work. Given imperfect information on skills, firms act rationally to relate workers' potential productivity to their educational achievement in the first selection round. In addition, employers may modify their recruitment criteria due to changes in management and work organisation and to technological innovation. Thus, there may be an increasing demand for professional, managerial and technical workers as well as a more intensive struggle for competitive advantage among the individuals in education and the labour market.

Robinson/Browne (1994) point out that human capital theory and the signalling/screening as well as credentialist theories do not exclude each other, but refer to different fields of relevance. Thus,

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[19] France, Germany, Ireland, Italy, Netherlands, Spain, the UK.

[20] The project is financed by CEDEFOP. The results referred to here reflect analyses of the first project phase. The results of the second and third phase are to be expected by mid 1998.

educational credentialism may be a phenomenon only in specific segments of the labour market, e.g. the public sector, and may refer more to the starting period in working life (Graff 1996).

Other studies have proposed elements for a better understanding of the logic of certificate distribution in the job market, in particular those which can be classified as "mismatch" theories between education and employment (cf. e.g. Franz 1996). These theories try to combine both the human capital and the credentialist view and focus on the dynamics of the education and training system on the one hand, and the system of production on the other (Carnoy/Levine 1985).

4. TRENDS AND STRATEGIES TO EMPLOYMENT CREATION

Main objectives of current policy and research related to work and skills are the reduction of unemployment, the rise of the qualification level of workforce and of the competitiveness of firms, and the integration of disadvantaged groups in the labour market. Concerning the first goal it is important to point out that labour market and qualification policies should not restrict themselves to the reduction of unemployed people but have to include those

- who retrenched from labour market, are working in publicly financed job creation schemes or in the shadow economy,
- who are looking for their first entrance into the labour market after leaving schools or training,
- who are threatened by unemployment or work in precarious jobs,
- whose qualifications and skills are not used sufficiently or have become obsolete.

The second goal - the rise of the qualification and skill level of the population and workforce and of firms competitiveness - can be justified by numerous analyses which point to the close connection of innovation, skills, and productivity. Closely connected is the objective to integrate those groups in society which are disadvantaged by nature or by the ongoing process of transition including disabled people and all those unwillingly being affected by unemployment and social exclusion.

4.1 Job creation and ways to full employment

The high and persistent unemployment in quantitative and qualitative terms and its social, economic and fiscal costs have long raised the question whether unemployment could be overcome by the emergence of new jobs and occupations, and which policies would stimulate growth and employment. These aspects concern the demand side (investment, liberalisation) as well as the labour force supply, in particular by a redistribution of the volume of labour by working-time adjustments.

However, the creation of new employment opportunities could partly be compensated for by an increasing labour force potential and would thus not reduce unemployment to the same extent. The linkages between "growth in GDP" → "productivity" → "employment" → "reduction in unemployment" are discussed controversially in research literature, although for Germany the link between growth and reduction of unemployment ("Okun's law") appears to exist (Schalk/Lüschow/Untiedt 1997).

When discussing the aspects of "new jobs", it is important to distinguish between:

- the (quantitative) *growth in job numbers*; here particular attention should be paid to:
  - the (specific) creation of jobs in certain sectors or occupations, on the one hand, and
  - on the other, the net increase in employment in the whole economy, i.e. by balancing out job increases and losses in different economic segments.
- the (qualitative) change of *job contents* with the emergence of changing or new forms of jobs and occupations with related implications for skill requirements and qualifications. This aspect has to be seen independently of the quantitative development since qualitative changes may also occur in shrinking job areas.

These aspects will form the background for the following discussion of research approaches and results concerning new jobs.

4.2 Ways to full employment: strategies and policies

In the past ten years several strategy papers and scenarios have proposed ways to create employment and reduce unemployment. Examples to be mentioned here are the early proposals of the "Kreisky Commission" 1987/88 (cit. in: Europäisches Gewerkschaftsinstitut 1990), the White Paper on Growth, Competitiveness and Employment by the European Commission (1993), the OECD Jobs Studies (1994, 1995, 1996) and various strategies proposed by research institutions, e.g. McKinsey Global Institute 1994, Bertelsmann-Foundation (Huckemann/Suntum 1994, cit. in Suntum 1995) and IAB (1996).

The White Paper of the European Commission (1993) expressively sets out ways to create 15 million additional jobs in the EU by the end of this decade, thus halving unemployment in the Member States. Concerning complementing economic measures to increase growth and investment, priorities are set in the active re-integration of the unemployed through training measures, the further creation of part-time work and the improvement of occupational opportunities for women.

The OECD Jobs Studies (1994, 1995, 1996) on the whole agree with the analyses of problems and the policy recommendations of the White Paper, in particular concerning the re-integration of the unemployed, increased part-time work and improved educational and training systems through the encouragement of life-long learning. More pronounced than the White Paper the OECD relies on market forces and warns against an overdrawn and badly constructed social security system which could undermine the inclination to adapt to structural change.

As a result of a comparative study for six countries (Japan, USA, Germany, France, Italy and Spain) the McKinsey Global Institute (1994) holds that besides dysfunctions on the labour markets, restrictions on the markets for goods and services are mainly responsible for the insufficient creation of new jobs. According to this analysis, new jobs are only to be expected in the service sector. Unlike in the USA, in Europe market restrictions and regulations could impede investments and job creation.

A comparative analysis of 17 industrial countries carried out by the Bertelsmann-Foundation (cf. Huckemann/Suntum 1994) reveals that the countries with most success in job creation in the period 1980 to 1993 were those where the tariff partners agreed to moderate wage increases without major strikes and to accept flexible working conditions (in particular concerning part-time work). The study draws the conclusion that job creation is best achieved by a consequent strategy oriented towards the market and towards social and monetary stability. In addition, active labour-market policy, however within the limits set by financial constraints, and in particular retraining and job creation schemes are of substantial importance.

Econometric simulations of the IAB (IAB-VI/1-8000, 1996)[21] calculate measures aiming to reduce unemployment in West Germany by half in the period 1996-2000 and beyond. They come to the conclusion that only a set of strategies may be able to increase employment and also reduce unemployment substantially *(table 1)*.[22] Employment gains could total almost 2 million jobs in the most optimistic scenario. Assuming that about 2/3 of these additional jobs will be filled by the unemployed[23], the level of unemployment could then be reduced by around 1.3 million.

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[21] The measures outlined in this paper are steadily adjusted to new developments; the paper of reference here is dated from April 1996.

[22] The different scenarios are based on proposals of the social partners. These scenarios are compared to a scenario which is expected if no political measures are taken. In view of the continuous rise in unemployment in Germany, (January 1998: 4.5 million) and to the difficulties in reaching consensus between all actors, the German Government seems to have abandoned the goal of halving unemployment by the year 2000/2001.

[23] According to past experience, two thirds of additional jobs created will be filled by the unemployed, and to one- third by the "hidden labour force" (i.e. persons, who are not registered unemployed but are willing to work if they are given the opportunity).

Table 1:

Measures to employment creation: IAB-scenarios for West Germany

Scenario	Description of measures	employment effect[1] (1000)	
		2000	2005
A4	salary increase equals inflation 1997-2001; reduction of overtime by 40%; abolition of property and trade tax; lowering of contribution to social insurance by 1%-point p.a. 1997-2000; increase of VAT to 16% 1997 and 17% 2000; cut of social insurance expenses and subventions	698	1.182
G1	working time per week in 2000: 35 hours, in 2005: 34 hours (no wage adjustment); constant operating hours; reduction of overtime by 40%; lowering of domestic interest rates by 1%-point	1.214	914
G2	as G1, additional assumptions: lowering of interest rates in USA by 1%-point; higher GDP-growth in EU by +1%; additional public investments by 10 billion DM	1.698	1.624
S2	salary increase equals inflation 1997-1999; reduction of overtime by 40%; additional increase of part-time work by 5%-points; abolition of trade tax; additional increase of mineral oil tax in 1997 and again in 1999; reduction of social insurance expenses by 20 billion DM and of subventions by 20 billion DM from 1997 onwards	1.985	1.342

[1] compared to a basic scenario (mainly without additional policy measures)
source: IAB-VI/1-8000 (1996)

In her analysis of employment and job creation, the European Commission/Eurostat (1996: Employment in Europe) identify three sectors of low, medium and high job growth in the past. It is expected that these sectors probably have potential for employment and job growth in the future, too. When attributing present skill structures to these sectors it becomes obvious that the growing sectors tend to have lower proportions of low skilled workers *(table 2)*.

- Low growth or declining sectors are agriculture, manufacturing, mining and electricity/gas/water. These will become increasingly less important on the labour market.
- Medium growth sectors are identified as construction, distribution, transport and communication, banking/insurance and public administration. However, some of them have been marked by slower expansion in recent years. And employment expansion in the public sector is likely to be limited by public budgets in most countries.
- High growth sectors are exclusively found in the services areas, in particular in business related and personal services, health and recreational services, and in education and training. However, large parts of these services are influenced directly or indirectly by public budget constraints and by political decisions. Thus it appears rather difficult to make a forecast for all of these areas.

In conclusion, proposals on how to create full employment or at least increase employment apparently show that there is no panacea or "king's way" to overcome unemployment. But they also show that the way to full employment is not a mere utopia. In the short and medium-term, economic measures to increase growth and investments seem to be most efficient, but should be complemented by labour-market and training measures in order to improve the allocation on the labour market and to avoid or reduce structural imbalances. In the long run, however, the rising qualification and skill structure of the labour force becomes a strategic policy to enhance economic growth and productivity.

Table 2:

Educational attainment[1] by sectors[2] and expected employment growth in the EU 1995 (%)

Expected growth	sector	upper sec. Education (ISCED3)	third level (ISCED 5-7)	total
low growth sectors	agriculture	5	27	32
	mining, energy	21	50	71
	manufacturing	15	44	59
medium growth sectors	construction	10	46	57
	distribution	11	47	58
	transport, communication	12	49	60
	banking, insurance	25	56	81
	public administration	26	49	74
high growth sectors	hotels, restaurants	7	39	46
	education	63	23	86
	business related services	37	40	77
	health, social services	30	39	69
	total	21	42	64

[1] ISCED, 25-59 years old population [2] NACE 1-digit differences by rounding
source: European Commission/Eurostat: Employment in Europe 1996

4.3 ICTs and employment growth

Information and communication technologies, the liberalisation of telecom-markets and the dissemination of new media have been regarded for long as the most important forces in economies to raise productivity and employment. However, the optimism of the eighties and early nineties is somewhat being replaced by a more realistic assessment taking into account the experiences made in the past few years. The following chapter presents some projections done in the past years. It should be added, however, that only few of them analyse the net effects of ICTs, i.e. balance out job gains and job losses in other industrial sectors.

As early as 1991, *Freeman/Soete* presented scenarios for the impacts of ICT in D, F, I, and the UK, supplemented by additional estimates for other countries. In their reference scenario of moderate ICT diffusion the authors predict for the year 2005 a slightly decelerating growth in GDP below the 3% threshold, and thus pressure on the labour market. Labour demand should increase by only close to 1% per annum, and unemployment should not fall since the labour supply should grow. An accelerated scenario of rapid ICT diffusion even results in a fall in employment because of an accelerated rise in productivity.

A study of the *METIER Consortium* (1995) for EUR 12, using econometric models, compares the impacts of an accelerated diffusion of ICTs with that of slow diffusion up to the year 2010 *(table 3)*. The accelerated scenario results in an increase of 6 million jobs throughout the 12 EU countries, and in a slightly reduced unemployment. Unemployment would rise significantly in the case of a slow ICT diffusion. The authors point out, however, that an estimate of such employment balances is connected with considerable imponderabilities.[24]

Table 3:

Impacts of ICT diffusion on growth and employment (EUR 12 up to 2010)

	1992	accelerated ICT diffusion[1]	slow ICT diffusion [1]
GDP growth p.a. (%)	-	2.6	2.4
labour force (mio)	154	180	180
employment (mio)	139	166	160
unemployment (mio)	15	14	20

[1] advanced communications, incl. traditional telecom-services and new networks and services
source: METIER consortium 1995

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[24] Thus for example, labour supply in the EU was held to be constant.

Prognos/DIW (1996), based on trend-scenarios, expect for the year 2010 around 180 000 new jobs in the media and communications sectors in Germany. However, a total employment balance, including job variations in other sectors, was not made.

Little (1996) distinguishes between suppliers and users of information. Based on trend scenarios and expert ratings he expects for the period 1995 to 2010 in Germany 153 000 new jobs in supply sectors and 57 000 in user sectors, which are induced by "TIME sectors".[25] This job growth, however, could only partly compensate for the job losses in other sectors.

In a projection for EU countries, Little (1996) expects that a strict liberalisation of the information sectors would create between 3 and 6 million new jobs. A total employment balance however was not presented. A further 6 to 8 million jobs would be subject to changes in their contents and requirements.

One of the most detailed European studies on the impacts of ICTs has been made by European research institutes under the co-ordination of *BIPE Conseil* (1996). The country studies and the European study analysed the effects of a liberalisation of Europe's telecom market up to the year 2005. The scenarios are based on econometric studies for all 15 Member States and provide quantitative and qualitative forecasts of employment change.

Four scenarios have been modelled concerning rapid/slow diffusion of technologies, each combined with rapid/slow liberalisation of the telecom sector. The results confirm firstly the employment effects on the telecom sector itself, and secondly the macro-economic effects for each country and for the EU community as a whole:[26]

Throughout Europe the liberalisation of telecommunications will result in a substantial reduction in traditional operators, according to all scenarios. These job losses could however be partly offset by an increase in jobs for other telecom staff. However, only in the most "optimistic" scenario is a net increase in telecom jobs expected.

The macro-economic effects are either indirect or direct. Taking both effects together, the change in employment appears to be more or less positive in all scenarios. The results for the whole of Europe[27] measure a wide spectrum of overall employment effects, ranging from 228 000 to 1.3 million new jobs in the most "pessimistic" and the most "optimistic" scenarios *(table 4)*.

Table 4:

Employment effects of the liberalisation of telecommunications in Europe 15 up to 2005, according to extreme scenarios[1] (1000 jobs)

job creation or generation	gradual liberalisation/ slow technological diffusion	rapid liberalisation/ rapid technological diffusion
direct job creation in telecommunications	-216	93
job generation by indirect effects	329	539
jobs generated by global economic improvement and business climate	115	668
global impact for Europe	**228**	**1300**
addition of national impacts in 15 EU countries[2]	93	625

[1] compared to a scenario of non-liberalisation - [2] global impact for Europe is higher than the sum of national impacts because of synergy effects or effects that cannot be attributed to a single country

source: BIPE Conseil 1996

Employment aspects in the context of ICTs were also addressed in a workshop on "The economics of the information society", organised in 1995 by the OECD in association with the European Commission (Dumort/Dryden 1997). Although the positive aspects of ICTs, as regards work and skills, have been stressed, there was substantial doubt about the short and medium-term effects on employment growth.

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[25] TIME = telecommunication, information technology, media, electronics.

[26] For detailed country results cf. BIPE Conseil 1996.

[27] Note that for the EU Community as a whole the employment effects are greater than the addition of effects for all single countries.

4.4 New areas of employment: scenarios and forecasts

Closely connected with new technologies and forms of work are hopes to overcome unemployment by the emerging of new jobs in different fields of economic activities (e.g. new media, leisure and tourism sectors, health care, ecology etc.). Already ten years ago an expert group invited by the European Commission discussed the topic of new forms and areas of employment growth (BIPE/Nadel 1988) and many of their conclusions were confirmed and still appear valid today.

This refers in particular to the contribution of Lindley (1988), who analysed the aspects of the quantitative and qualitative emergence of new jobs and their implications for skill contents, changing forms of jobs and for policy. Analyses of quantitative and qualitative structural changes were presented for Spain, Italy, Greece, Ireland and the United Kingdom.

Lindley concluded that

- the growth of new forms and areas of employment will fail to compensate sufficiently for the loss of jobs elsewhere and for the growth of labour supply;
- the main areas of job growth are business and related services, tourism, leisure and health care;
- the occupations most likely to expand are the more highly qualified groups;
- multi-functional and flexible skills are increasingly required;
- new forms of work contracts and types will develop, but there is also the danger of over-qualification and social exclusion;
- changes in the location of enterprises, out-contracting and the role of SMEs would increase.

However, some current developments which have rapidly changed jobs and work in the past years were not so much in the foreground then. These are the spread of new technologies, in particular the new key technology ICT, and the role of information, changes in division and organisation of work, international competition and ecology-related work and production (OECD 1994a).

Most of the attempts to estimate future quantitative developments in overall employment or in the structure of jobs are carried out in the framework of structural or econometric forecasts (cf. chapter 5). In addition, the European Commission (e.g.: Employment in Europe 1996) has published comprehensive material on job creation in the past and possible outlooks.

In summary, one can state once again that there is no one single way to increase employment and to reduce unemployment but a set of strategies and policies requiring a high degree of consensus between all actors. The creation of additional employment needs not necessarily reduce unemployment to the same extent. Success in reducing unemployment also depends, among other things, on the size and development of the labour force potential (including the "hidden labour force") and will be limited if there are structural imbalances in the labour market, e.g. due to a mismatch of qualifications or to regional and sectoral disparities.

4.5 Transitional labour markets

For the time being, therefore, full employment is still a long way off. There are many proposals on how to ease the period of transition and to bridge the gap between insufficient employment opportunities and the high level of labour force potential.

One striking proposal by Schmid (1994) is the creation of "transitional labour markets" which combine regularly paid work with flexible transitions in different socially or individually useful activities, such as learning, educating, cultural and political participation, or social engagement *(figure 3)*.

To achieve this goal, the bridges to the regular labour market from those activities have to be reinforced and permanently institutionalised. For individuals or firms, they should represent temporary and reversible options which could be used at certain stages of the biography or economic situations. Transitional labour markets may thus form an elastic buffer which can expand in times of recession and contract in boom situations. Schmid regards flexible labour markets not only as a socially acceptable, but also as an economic efficient alternative to a society, in which some people have too much work whereas others are unemployed.

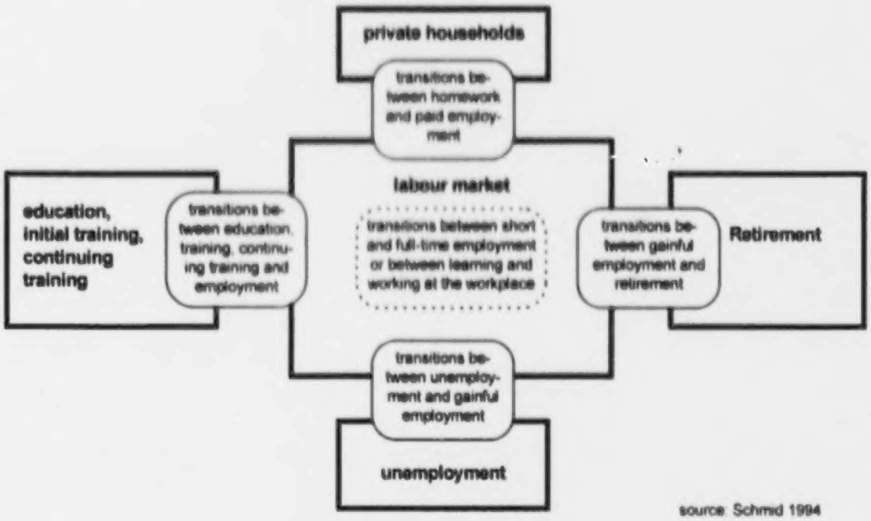
Best practices are found, for example, in the Danish model of job rotation and in measures concerning the promotion of modernisation combined with the extension of firms' or extra-company further training institutions in Saarland. Others are the funding measures and mixed further training schemes in Denmark and The Netherlands (cf. Auer 1992; Auer/Schmid 1993; Höcker 1992).

5. FORECASTING EMPLOYMENT BY SECTORS, OCCUPATIONS AND QUALIFICATIONS

Preventive education and labour-market policy is dependent on some notion about the future, i. e. on possible future developments and structural changes in employment and qualification requirements. Forecasts of this kind may be of a quantitative-structural, or of a qualitative nature. The determination of future "innovative" qualification and skill contents, on the other hand, is an area covered by occupation-related pedagogic and curricular research. An alternative to quantitative forecasting are scenarios which are based on past trends and (more or less subjective) expert estimates concerning different socio-economic developments.

Figure 3:

Transitional labour markets


private households
transitions between homework and paid employment
labour market
education, initial training, continuing training
transitions between education, training, continuing training and employment
transitions between short and full-time employment or between learning and working at the workplace
transitions between gainful employment and retirement
Retirement
transitions between unemployment and gainful employment
unemployment

source: Schmid 1994

In the following chapter we will concentrate on scenarios and structural forecasts.

5.1 Scenarios of future education and training

A scenario aims at describing possible or desirable future situations and the means or events which might lead to their realisation. Taking account of the uncertainties in all spheres of social and economic life, scenarios should increase the awareness of the complex relationships and may thus function as an early-warning signal. In shedding light on risks and chances, a scenario may also be useful for formulating strategies and identifying options (Schoemaker 1995).

Some scenarios to be mentioned here are:

- a "Delphi-enquiry" among European experts on policy needs for research, study and experimentation in European education and training, carried out by SCIENTER (1996) on behalf of the European Commission/DG XXII;
- an examination of economic, social and cultural trends in Europe, carried out by de Jouvenel (1996) on behalf of the European Commission/DG V;
- the Euro-Delphi on the future of adult education in 14 European countries, carried out between 1993 and 1995 and sponsored by the EC Task Force on Human Resources, Education and Youth (Leirman 1996);
- a scenario of future developments of the Dutch population, households, training and labour supply in the 25 years to come (Beer/Roodenburg 1997);
- a Delphi-enquiry among mostly national experts concerning long-term trends in education and training in Germany and their implications for policy is currently being conducted by Infratest on behalf of the German Federal Ministry for Education, Science, Research and Technology (1997/98).

Below, a scenario for future education and training in Europe, elaborated by Wieringen (1997) for The Netherlands will be presented briefly.

The scenario is based on a Delphi-enquiry addressed to around 100 experts and considering some 100 trends (e.g. flexibilisation, ageing, mobility, technology, employment structures, regional developments, etc.). The experts were asked for written statements on three "environments" relevant to education and training and considering the trends in the:

- economic and technological environment;
- employment environment;
- training and knowledge environment.

The analysis of this first round in the enquiry aimed at providing an empirically reliable and theoretically founded reduction in the variety of trends considered. In a second round, some more specific trends - linked to several factors of influence - were presented to the experts once again. Their statements served as a basis for the construction of four scenarios.

Based on these scenarios, a range of strategies was formulated which are supposed to have a high degree of probability:

- increasing individual responsibility for training;
- increasing importance of training courses organised by industrial branches;
- growing division of responsibility: functionally oriented training for the industry;
- decreasing investment of industry in lower educated people.

5.2 Forecasting occupational and qualification structures

In Europe relatively few research institutes undertake quantitative forecasts of occupational and qualification structures. This may be attributable to the lack of suitable or available statistical data and, in addition, to a wide-spread scepticism concerning the reliability and the relevance of forecasts.

Although the scepticism concerning the importance of quantitative forecasting for policy-making is legitimate to a certain extent, a qualification must be made. The decisive question is how a forecast is constructed and for what purpose it is used. Forecasts may be useful for political reasons and decision making when, for instance alternative development lines and the effects of policy measures are to be evaluated. Forecasts may also function as a warning by outlining the direction a development might take if no countermeasures were adopted in time. In this case the forecaster might even be happy if his prediction was not fulfilled.

The European Commission (1994) expressively pleads for forecasts on the national, regional, local and firm level: "Vocational training should be co-ordinated with the needs of enterprises and individuals. The question is raised, how these needs could be considered, how changes of demand could be identified and how foreseeable changes could be anticipated and on which level." (p. 36) Concerning demand forecasting, the Commission claims:

- "as a tendency there are indications that improved demand forecasts are required;
- changes have to be anticipated better, concerning the national, regional, local and enterprise level;
- the European Community is asked to take initiatives in order to make the data collected available and comprehensible." (ibid.).

On the other hand, long-term aggregate forecasts may be also detrimental, particularly when they serve as a decision-making basis for young people's choice of training or occupation. This may lead to counteractive developments: the forecast destroys itself.

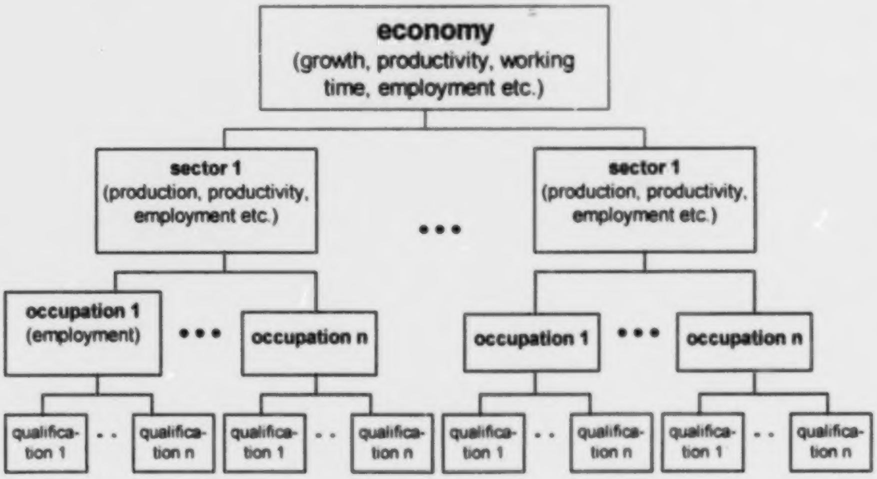
5.2.1 Methods and procedures

Most of the forecasts presented below are based on the "Manpower Requirement Approach" (MRA) and the "Social Demand Approach" (SDA), which both have a long history and need not be described here in detail.[28]

- The Manpower Requirement Approach calculates the future demand for manpower, i.e. the future number of jobs available, by different job characteristics (mainly by industrial sectors, occupations or work activities, levels and subjects of qualification).

Figure 4:

Procedure of the traditional Manpower Requirement Approach


economy
(growth, productivity, working time, employment etc.)
sector 1
(production, productivity, employment etc.)
...
sector 1
(production, productivity, employment etc.)
occupation 1
(employment)
...
occupation n
occupation 1
...
occupation n
qualification 1
..
qualification n
qualification 1
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qualification n
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qualification n
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The basis of the MRA is a macroeconomic or econometric forecast of future economic growth, productivity and other economic factors, from which future employment in the whole economy and by sectors is derived. In general, these macroeconomic forecasts include the estimation of a more or less large number of relations within the economy and their change due to expected developments of certain parameters. In most cases, alternative forecasts are being made in order to illustrate the scope of expected employment changes.

In further steps or modules, the macroeconomic and sectoral forecasts are broken down by job characteristics *(figure 4)*. Since the relationships between the numerous economic parameters and job characteristics are too complex and, in addition, require a huge quantity of empirical data not available in most countries, most forecasts of the job characteristics apply a *structural approach* in which employment figures by sectors are further broken down by occupations, qualifications and subject fields. These specific structures are extrapolated by trend regressions.

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[28] For a comprehensive review of the methods and applications of manpower forecasting approaches cf. for example: Weisshuhn (1977), Youdi/Hinchliffe (1985), v. Eijs (1993, 1994), Heijke (1994).

The *replacement demand* is calculated by using flows of workers out of employment, (e.g. retirement, deaths, migration, etc.), usually differentiated by qualifications, occupations, age, sex, etc. It is assumed that the vacant jobs will be filled by persons with similar characteristics. Thus, the number of persons remaining in employment during the whole projection period represents the *residual stock*.

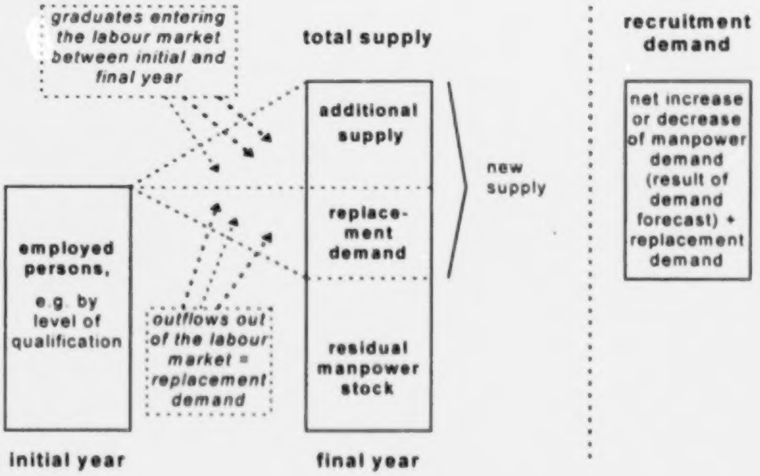
For estimating the *recruitment demand*, i.e. the number of jobs available for future graduates, and thus for estimating their employment prospects, the replacement demand and the net change in total demand are added up.

- Supply projections normally use the *Social Demand Approach* and estimate the future flows of persons through education and training and their entry into the labour market. By adding up all new entrants during the projection period, the total *new supply* of persons (by qualification, etc.) is determined *(figure 5)*.

  The new supply and residual stock add up to the total supply of manpower in the projection year.

Figure 5:

Forecasting manpower supply and recruitment demand


graduates entering the labour market between initial and final year
total supply
recruitment demand
additional supply
new supply
net increase or decrease of manpower demand (result of demand forecast) + replacement demand
replace-ment demand
employed persons,
e.g. by level of qualification
outflows out of the labour market = replacement demand
residual manpower stock
initial year
final year

- Structural *labour-market balances* compare the total number of available jobs - by sectors, occupations and/or qualifications - (MRA) with the respective supply figures (SDA) or the recruitment demand with the new manpower supply. Those balances, however, should be interpreted cautiously since they are calculated independently of one another, i.e. they neglect interactions between supply and demand. Furthermore, they neglect substitution and mobility processes on the labour market, which may lead to a balancing out of surpluses or shortages in specific job areas.

5.2.2 Forecasting sectoral and occupational change

Concerning forecast results by *industrial sectors*, the forecasts more or less confirm the ongoing trends *(table 5)* and the theory of Fourastié discussed above:

- towards an increase in the employment in the service sectors;
- towards stagnating or slightly rising proportions of employment shares in the manufacturing sectors and
- towards a continuing fall in employment (in absolute and relative terms) in the primary sector.

Table 5:

Long-term employment change by industrial sectors. Forecast results for West-D, FIN, IRL, NL, UK (shares in total employment, in %)

country, year	agriculture, forestry, fishery	manufacture, energy, construction, transport	private or market services	public or non-commercial services	total
West-D 1976	6.3	45.2	25.7	22.8	100
1991	3.3	39.3	38.1	19.3	100
2000	2.5	36.4	40.0	21.1	100
2010	2.0	33.6	41.6	22.8	100
FIN 1970	20.6	42.0	23.9	13.6	100
1990	8.0	36.2	27.5	28.3	100
2010	4.9	32.1	30.5	32.5	100
IRL 1981	16.6	32.1	33.2	18.1	100
1991	13.7	28.4	37.7	20.2	100
1998	10.0	28.3	41.2	20.5	100
NL 1993/94	4.3	27.7	39.6	28.4	100
2000	3.4	27.0	41.5	28.1	100
UK 1954	9.1	34.5	41.0	15.4	100
1994	2.6	18.5	54.2	24.7	100
2001	2.3	16.6	57.4	23.6	100

note: the figures are extracted from publications that did not always indicate detailed prescriptions of the sectors included. Therefore some of the results may not be fully comparable across countries. However, the focus of these results lies on the intertemporal comparison of structural change

sources: ROA 1995 (NL); Wilson/Webb 1995 (UK); Canny/Hughes/Sexton 1995 (IRL); Prognos 1993 (West-D); Poropudas 1994 (FINL)

Similarly, available evidence on future demand trends for the *occupational structure of jobs* indicate a significant growth in professional and technical occupations and in administrative and managerial occupations. *Table 6* presents forecast results for some European countries as well as for Australia, the USA and Japan. The results show the relatively low growth in production and some service related occupations and a significant decrease in agricultural occupations.

5.2.3 Future manpower demand and supply by qualifications

The available forecasts confirm, in general, the rising skill requirements of jobs. This applies above all to most levels of higher education and to some groups of highly skilled manpower at the intermediate level. However, forecast results for the intermediate skills are not uniform in direction and scope. A general trend found in all countries concerns the dramatic decline in job opportunities for low-skilled and unskilled workers. Since the education and training systems of these countries are rather different, the forecast results will be discussed separately.

Table 6:

Employment change forecasts by occupations/work activities: Results for some industrial countries (%)

occupation	Australia		Finland		Ireland		Japan		United Kingdom		USA	
	2001	'91-'00*	2010	'90-'10*	1998	'91-'98*	2000	'91-'00*	2001	'94-'01*	2005	'92-'05*
Professional and technical	20.9	1.6	) 31.5	) 9.4	17.8	1.6	14.8	3.8	20.3	1.7	19.3	2.1
Administrative and managerial	8.2	0.2	)	)	11.3	1.2	3.9	0.1	18.5	1.3	10.3	0.3
Clerical and related	16.5	-0.4	12.3	-0.4	14.2	0.3	19.5	1.0	14.6	-1.3	17.2	-1.2
Craft and skilled manual	16.0	0.4	) 19.9	) -7.4	12.8	0.3	) 42.2	) -2.1	12.5	-1.3	10.4	-0.8
Production, service, labourer	22.5	-1.8	)	)	15.1	-1.2	)	)	25.7s	1.7	29.6	0.2
Sales worker	13.6	0.7	31.5	1.3	18.6	1.4	14.8	0.2	7.4	-0.1	10.6	-0.1
Agriculture and related	2.4	-0.8	4.8	-2.9	10.2	-3.6	4.7	-2.5	1.0s	-2.0	2.5	-0.4
total	100.0	-	100.0	-	100.0	-	100.0	-	100.0	-	100. 0	-

West-Germany: work activities	2010	'93-'10*
training, care, law, information	17.3	1.0
organisation, executive tasks	9.1	2.4
research, development. planning	5.1	0.0
general + personal services	11.0	-0.6
clerical and assistant work	16.8	-1.1
commerce, trade work	11.1	0.4
repairing, restoring	6.3	0.3
controlling, machine operating	10.7	3.1
manufacturing, processing	12.6	-5.3
total	100.0	-

France: occupations	2000	'82-'00*
self-employed	8.9	-1.0
senior and middle management	21.3	6.6
civil service	14.8	0.1
teaching	5.8	0.6
service employees and personnel	19.2	3.1
manual workers	25.5	-5.9
farmers, agricultural workers	4.6	-3.5
total	100.0	-

* change of percentage shares (in % points) s = estimated differences by rounding

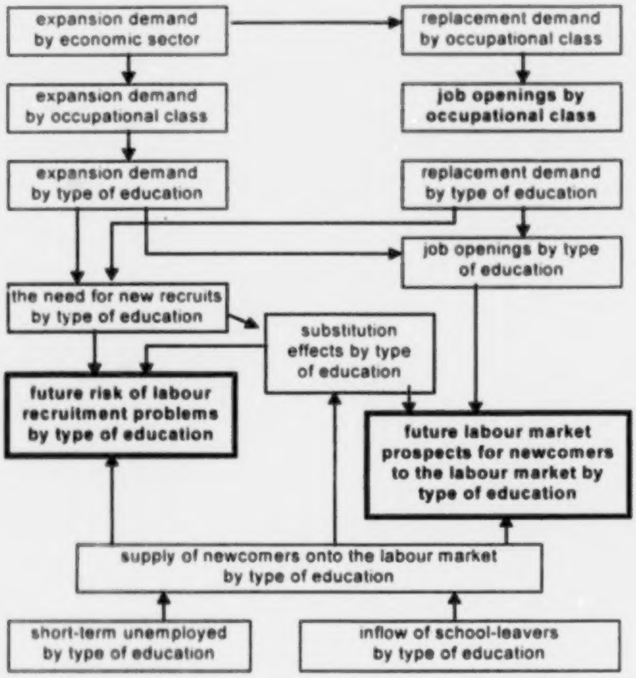
sources: AUS, JAP, USA: Jagger/Morris/Pearson 1996; UK: Wilson/Webb 1995; IRL: Canny/Hughes/Sexton 1995; FIN: Poropudas 1994; West-D: Tessaring 1994; F: Rajan 1989

5.2.3.1 *The Netherlands*

Forecasts of demand and employment prospects for people with completed education and training in the Netherlands are being made in particular by the Research Centre for Education and the Labour Market (ROA). They are part of the ROA's information system on education and the labour market *(figure 6)*[29]. The period covered by the most recent forecasts available are the years 1995 up to the year 2000 (cf. ROA 1995).

Figure 6:

Forecasts in the ROA information system on education and the labour market


expansion demand by economic sector
replacement demand by occupational class
expansion demand by occupational class
job openings by occupational class
expansion demand by type of education
replacement demand by type of education
job openings by type of education
the need for new recruits by type of education
substitution effects by type of education
future risk of labour recruitment problems by type of education
future labour market prospects for newcomers to the labour market by type of education
supply of newcomers onto the labour market by type of education
short-term unemployed by type of education
inflow of school-leavers by type of education

source: ROA 1995

In particular, the ROA forecasts include the following components ("modules"):

- The expansion demand - broken down by industrial sectors, occupations and types of education - represents the demand change within the projection period; it is calculated by trend-extrapolation of occupational and educational structures;
- The replacement demand by type of education denotes the expected outflows of workers by age and gender (retirement, death etc.) out of the labour market;
- The recruitment demand indicates job openings for graduates; it is the sum of expansion and replacement demand;
- The new supply, i.e. the flows of school-leavers into the labour market represents the outflows of graduates out of the education and training system and the transitions into the labour market; it is calculated by a flow-model;
- Substitution processes indicate the opportunities for persons with a specific education to switch to other sectors or occupations. They are calculated for market segments, occupational sub-markets, taking into account specialisation and flexibility, and similarities between different levels.

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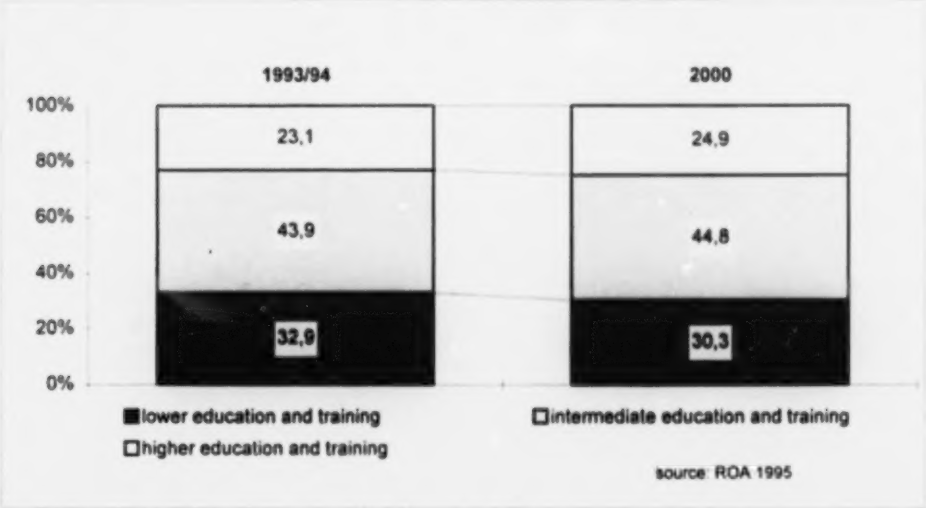
[29] For a description of the ROA information system on education and labour market cf.: Heijke/de Grip 1991)

The forecasts of ROA (1995) indicate that the highest growth rates are to be expected for persons with higher education and training levels, especially in medical, paramedical, technical, agricultural and economic disciplines. These include the levels of Higher Vocational Education (HBO) and universities (UE/WO). Lower growth rates are calculated for Intermediate Vocational Education (MBO/LLW), except nursing and laboratory education, whereas the demand for all lower educational levels and those with only primary education will decrease substantially. The overall results are shown in *figure 7*.

Figure 7:

Manpower demand by qualification; NL 1993/94 - 2000 (%)



source: ROA 1995

The largest increase in demand and, depending on the type of training, the best career prospects are expected for higher education and higher vocational training levels. It is forecast that the demand and the job prospects for semi-skilled or unskilled workers will drop considerably. On the intermediate level, i.e. initial vocational training and apprenticeship, there is a slight but not above average increase. People with these qualifications, according to ROA, will increasingly be recruited for jobs which hitherto have been held by workers with a lower level of qualification.

Lower qualification levels are less in demand due to the fact that they are employed in occupations that grow relatively slowly or that will contract. And employers will require higher qualification levels for their occupations. This upgrading process leads to a further decrease in demand for unschooled workers or those at the lower vocational levels.

The ROA (1995) draws the following conclusions: "The overall employment share of Intermediate Vocational Education and apprenticeship training is not expected to increase any further in the coming years, but there are large differences between the various types of education at this level. Positive effects on employment levels derive mainly from the progressive upgrading of skilled labouring work. A qualification at the Intermediate Vocational Education level is increasingly becoming the minimum requirement for skilled labourers." (p. VI)

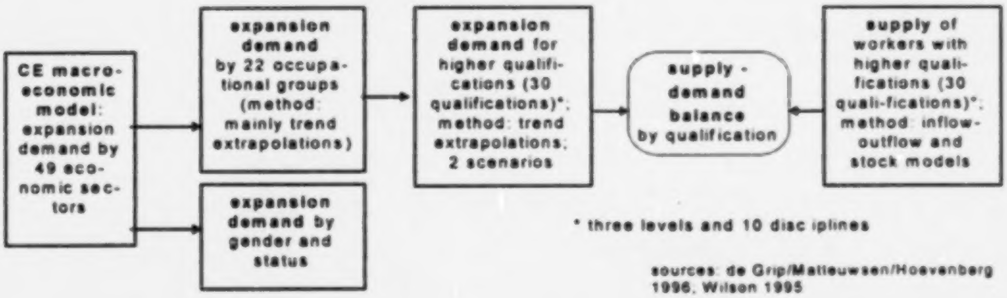
5.2.3.2 United Kingdom

For the United Kingdom, reference is made here to forecasts of the structure of employment carried out by the Institute for Employment Research (IER). Available forecasts for qualifications, occupations and the intermediate skills cover the period 1994 up to 2001 (cf. Wilson 1994; Wilson/Webb 1995, Wilson 1995).

The starting point for analysing and projecting labour market developments is a macro-econometric model developed by Cambridge Econometrics (CE) and distinguishing 49 economic sectors. The IER derives its forecasts of employment by economic sector using its own version of the Cambridge Multisectoral Dynamic Macroeconomic Model (MDM) of the UK economy. IER adds several sub-models to desagregate employment by occupation, employment status[30] and higher types of education.[31] *Figure 8* shows the links between the MDM model and the submodels.

Figure 8:

IER's macroeconomic model and submodels


CE macro-economic model: expansion demand by 49 economic sectors
expansion demand by 22 occupational groups (method: mainly trend extrapolations)
expansion demand by gender and status
expansion demand for higher qualifications (30 qualifications)*; method: trend extrapolations; 2 scenarios
supply - demand balance by qualification
supply of workers with higher qualifications (30 quali-fications)*; method: inflow-outflow and stock models

* three levels and 10 disciplines

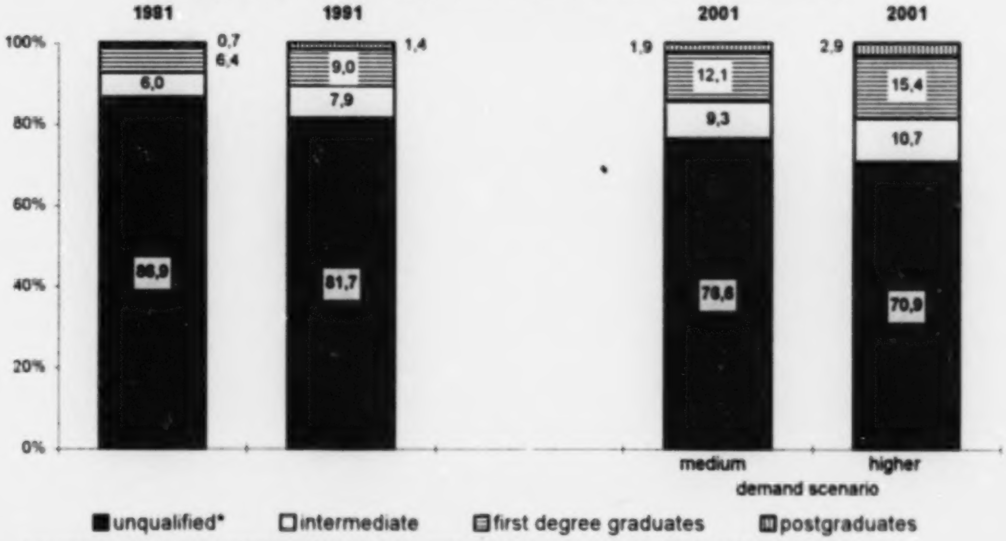
sources: de Grip/Matteuwsen/Hoevenberg 1996, Wilson 1995

The projections for qualified manpower in the UK show the high and above average increase in demand for highly qualified persons and the stagnating demand figures for unqualified workers, depending on the projection variant calculated.[32] Intermediate qualifications are expected to grow slightly slower.

Unskilled or low-skilled workers[33] which still represent around 4/5 of the total labour force, more or less stagnated in absolute job figures in the period 1981 to 1991. For the decade 1991-2001 a substantial decrease in demand, both in job figures and share in overall employment is projected *(figure 9)*.

Figure 9:

Manpower demand by qualification, UK 1981 - 2001 (%)



* "unqualified" include: lower intermediate qualifications, trade apprenticeship, O-levels or equivalent, CSEs, YT and without

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[30] full-time and part-time employees versus self-employed

[31] In addition, forecasts for UK regions are carried out.

[32] A "medium-term demand scenario" considers continuing trends of the proportions of qualified workers observed over the period 1981-1991. A "high demand scenario" assumes an accelerated increase of those trends, based on faster growth rates over the period 1991-1994.

[33] These "unqualified" workers, according to the IER forecast, include: lower intermediate qualifications, trade apprenticeship, O'levels or equivalent, CSEs, YT and without qualification.

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Balancing the results of demand against the projected supply of workers, IER draws the following conclusions:

Taking into account the limitations and sensitivities of forecasting results, "the main findings indicate that dynamic excess demand characterises most areas of occupational employment associated with higher level qualifications, i.e. supply has been growing rapidly but demand has been growing even faster. However, the significance of this varies greatly across the spectrum of different curricula." (Lindley 1994, p. 94).

The fact that considerably more graduates will be available on the labour market will probably lead to a displacement of lower qualified people by highly qualified in many areas. "Indeed, there is some evidence that when this happens, better qualified people may change the nature of the job being undertaken and so in a sense might create its own demand. It is clear, however, that traditional areas of graduate and higher level occupational employment are unlikely to be able to provide enough jobs to employ the large influx of newly qualifying entrants in the 1990s. The demand for graduates will need to rise in many occupations that have not in the past been regarded as requiring such qualifications." (Wilson 1995, p. 27)

The surplus of workers expected at the intermediate qualification levels will be even greater in the case of the semi-skilled or unskilled. This may be due to several reasons: crowding out of those on the intermediate level by people with a high level of qualification, a surplus of people with qualifications in the intermediate levels, with the consequence that workers with intermediate qualifications are being pushed into jobs with lower skill requirements.

Another study on future skill needs and supply published by the UK Department for Education and Employment (DfEE 1996/97) is mainly based on a forecast done by Business Strategies Ltd. (BSL) 1996. BSL "expects the trends that have occurred over the last couple of decades or so to continue over the period to 2006." (DfEE 1996/97, p. 36) In summary, DfEE draws the following conclusions:

"Medium and long-term shifts in industrial structure mean the occupational make-up of employment is likely to continue to change in favour of white-collar, non-manual occupations, especially those which require higher level qualifications. In contrast, overall demand for blue-collar, manual, occupations will decline.

But even in occupations which are in decline there is a clear need to train people to replace those lost to retirement and other occupations. Most importantly, even key intermediate-level occupations which are declining need a fresh supply of skilled labour.

The increase in the numbers of higher skilled jobs is only part of the challenge which lies ahead. It is becoming increasingly clear that the general skills content within most jobs is increasing. The greatest tests to the education and training system will occur where both numbers and skills are increasing." (p. 34)

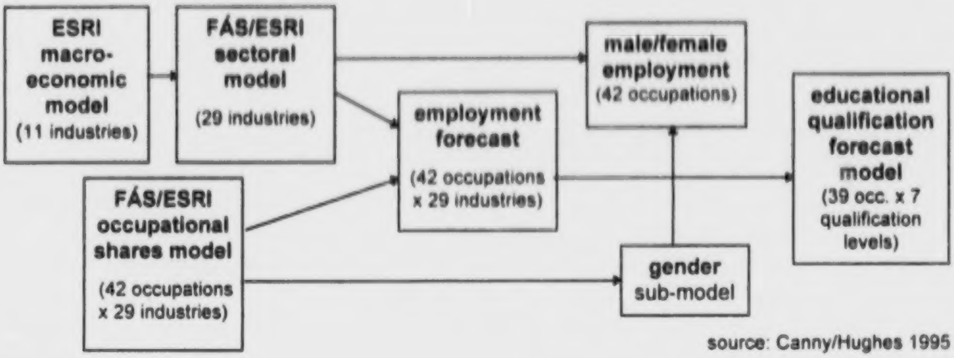
5.2.3.3 Ireland

Forecasts of the labour demand according to sectors, occupations and qualifications from 1991 up to 1998 for Ireland are carried out by the Economic and Social Research Institute (ESRI) and the Training and Employment Authority (FÁS). The forecasting model is based on ESRI's macroeconomic model which provides sectoral employment forecasts for 11 sectors *(figure 10)*. In a FÁS/ESRI sub-model these sectors are disaggregated by 29 industrial subgroups, each subgroup being further disaggregated by 42 occupations.

The forecasting method uses the manpower requirement approach and is made in two stages: In the first stage trend projections of the sub-sector shares of employment within each major sector are used; in the second stage the trend in employment share of each cell of the 42 by 29 matrix of employment by occupational and industrial sub-group are projected, using linear, logarithmic, or semi-logarithmic trend regressions. Further sub-models are used to forecast the female share of employment by occupations and to extrapolate the trends of educational qualifications for each of the occupational groups.

Figure 10:

The FÁS/ESRI occupational forecasting model


ESRI macro-economic model (11 industries)
FÁS/ESRI sectoral model (29 industries)
FÁS/ESRI occupational shares model (42 occupations x 29 industries)
employment forecast (42 occupations x 29 industries)
male/female employment (42 occupations)
gender sub-model
educational qualification forecast model (39 occ. x 7 qualification levels)

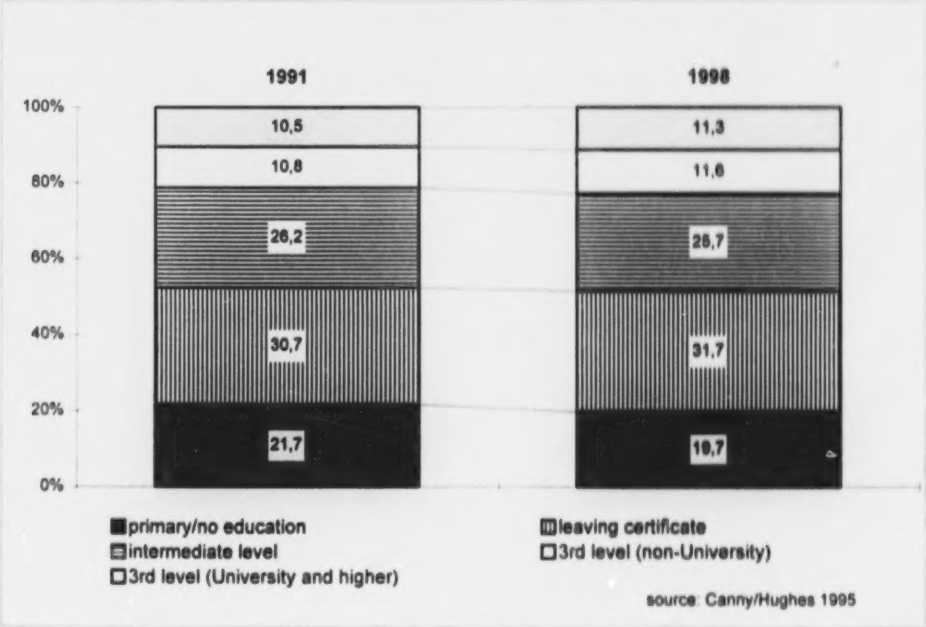
source: Canny/Hughes 1995

According to the forecasts, ongoing trends in the sectoral and occupational structure of employment in Ireland are closely linked to a rise in skill requirements. A growing demand is expected for people with general and vocational secondary school-leaving certificates, and for people who have successfully completed university or non-university higher education. This will be offset by a drop in the need for workers on the intermediate qualification level and is more or less zero for people only having completed school education, or initial training.

The results *(figure 11)* "show a strong trend towards higher educational requirements....In practical terms this means that the great majority of new jobs will be filled with persons with a Leaving Certificate or third level education. Thus, nearly 40 per cent of all new jobs will require third level education at non-university diploma or university degree level. ... Non-university third level education will be far more important for new jobs than for existing jobs ... The increases in educational requirements for new jobs mean that there will be virtually no opportunities for persons with only a basic primary level of education to fill new jobs being created....There should however be opportunities for employment of persons with Intermediate level as 21 per cent of new jobs will require this level of education." (Canny/Hughes 1995, p. 26)

Figure 11:

Manpower demand by qualification, IRL 1991 - 1998 (%)



source: Canny/Hughes 1995

ESRI draws the following conclusion: "Although one cannot make a direct connection between educational qualifications and skills there is some evidence that the skill level of the labour force is rising. ... The evidence for Ireland points to the growing importance of educational qualifications in a labour market which is becoming increasingly white collar. It suggests that there will be a need for a labour force in the future which is well educated and highly skilled. It will become increasingly important that poorly qualified workers presently in the workforce be given opportunities to attain further educational qualifications and/or training and it is vital that all school leavers should be encouraged to remain in school and attain qualifications which will equip them to take advantage of the new and expanding opportunities which are opening in the labour market." (Canny/Hughes 1995, p.27).

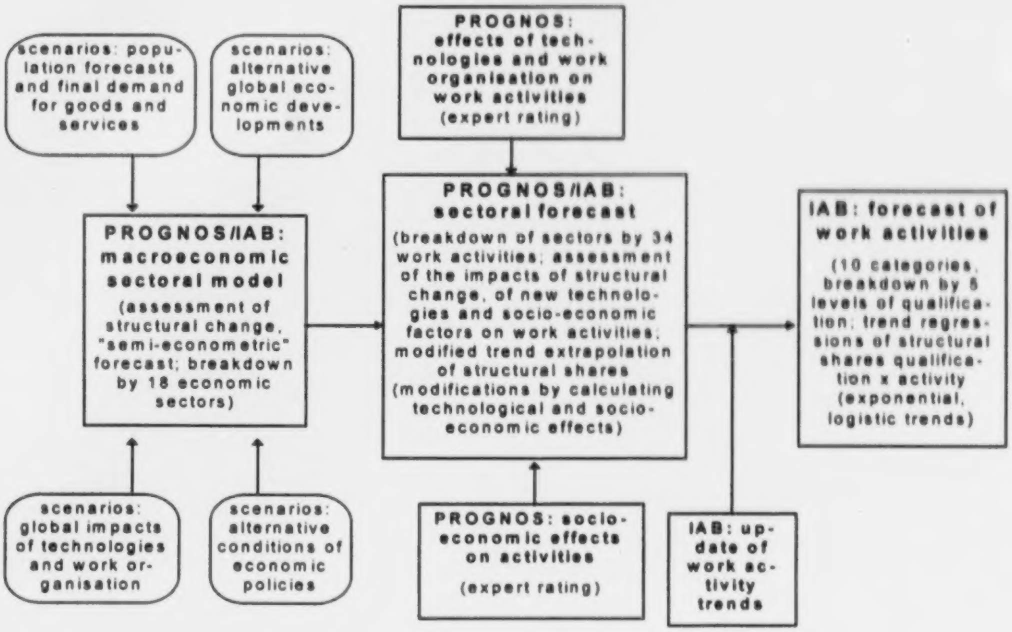
5.2.3.4 Germany

Medium and long-term employment forecasts in Germany are carried out by a number of research institutions. This also refers to structural forecasts of the future labour force demand and supply by occupations, work activities and qualifications (for comprehensive surveys of manpower forecasting in Germany cf.: Schultze 1996, Tessaring 1998).

The most recent projections of the structure of manpower demand and supply in Germany have been carried out by Prognos et al. (1989), Prognos 1993, IAB (Tessaring 1994); Weisshuhn et al. (1994) and BLK (1994). The demand forecasts are based on a modified manpower requirements approach and use trend regressions of specific proportions (by sectors, occupations respectively job activities, and qualifications) which are extrapolated into the future. The supply forecast by BLK (1994) uses inflow-outflow calculations and transitions. The updating of the labour force thus includes the new supply (inflows), replacement demand (outflows: retirement, death, emigration etc.) and age-specific variations of the labour force participation of males and females. The procedure of the joint forecasts of IAB and Prognos is illustrated in *figure 12*.

Figure 12:

Employment forecasting in Germany: Procedure of the joint structural forecasts of PROGNOS and IAB


scenarios: population forecasts and final demand for goods and services
scenarios: alternative global economic developments
PROGNOS: effects of technologies and work organisation on work activities (expert rating)
PROGNOS/IAB: macroeconomic sectoral model (assessment of structural change, "semi-econometric" forecast; breakdown by 18 economic sectors)
PROGNOS/IAB: sectoral forecast (breakdown of sectors by 34 work activities; assessment of the impacts of structural change, of new technologies and socio-economic factors on work activities; modified trend extrapolation of structural shares (modifications by calculating technological and socio-economic effects)
IAB: forecast of work activities (10 categories, breakdown by 5 levels of qualification; trend regressions of structural shares qualification x activity (exponential, logistic trends)
scenarios: global impacts of technologies and work organisation
scenarios: alternative conditions of economic policies
PROGNOS: socio-economic effects on activities (expert rating)
IAB: update of work activity trends

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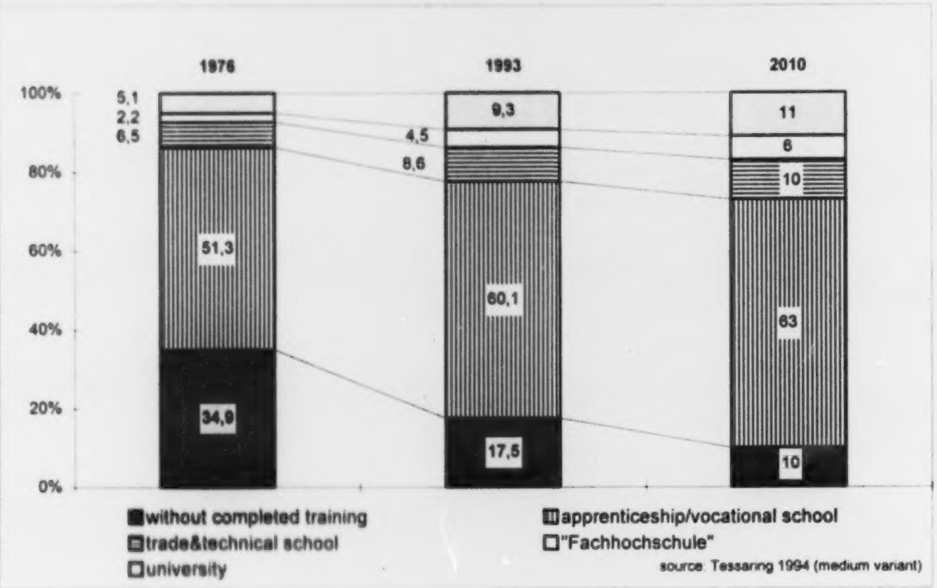
The projections for Germany carried out by IAB and Prognos (Prognos et al. 1989; Prognos 1993, Tessaring 1994) up to the year 2010 indicate a continuing growth in the service sectors and a corresponding decline in primary and secondary sectors. Similarly, service-related job activities - in particular "secondary service jobs"[34] - in all economic sectors are expected to increase further.

These shifts in the structure of employment are accompanied by rising qualification requirements in all job activities, resulting in a dramatic decline in the overall demand for unskilled workers and an above average rise in the demand for workers with higher qualifications.[35]

The demand for apprenticeship trained workers is expected to rise on average, resulting in an only slightly growing share within the overall labour force *(figure 13)*.

Figure 13:

Manpower demand by qualification, D-West 1976 - 2010 (%)



source: Tessaring 1994 (medium variant)

The projections also consider the *effects of technological and socio-economic influences* on work tasks and their implications for qualifications (Prognos et al. 1989, and an update published by Prognos 1996). In particular, the following factors of influence were distinguished (*figure 14):*

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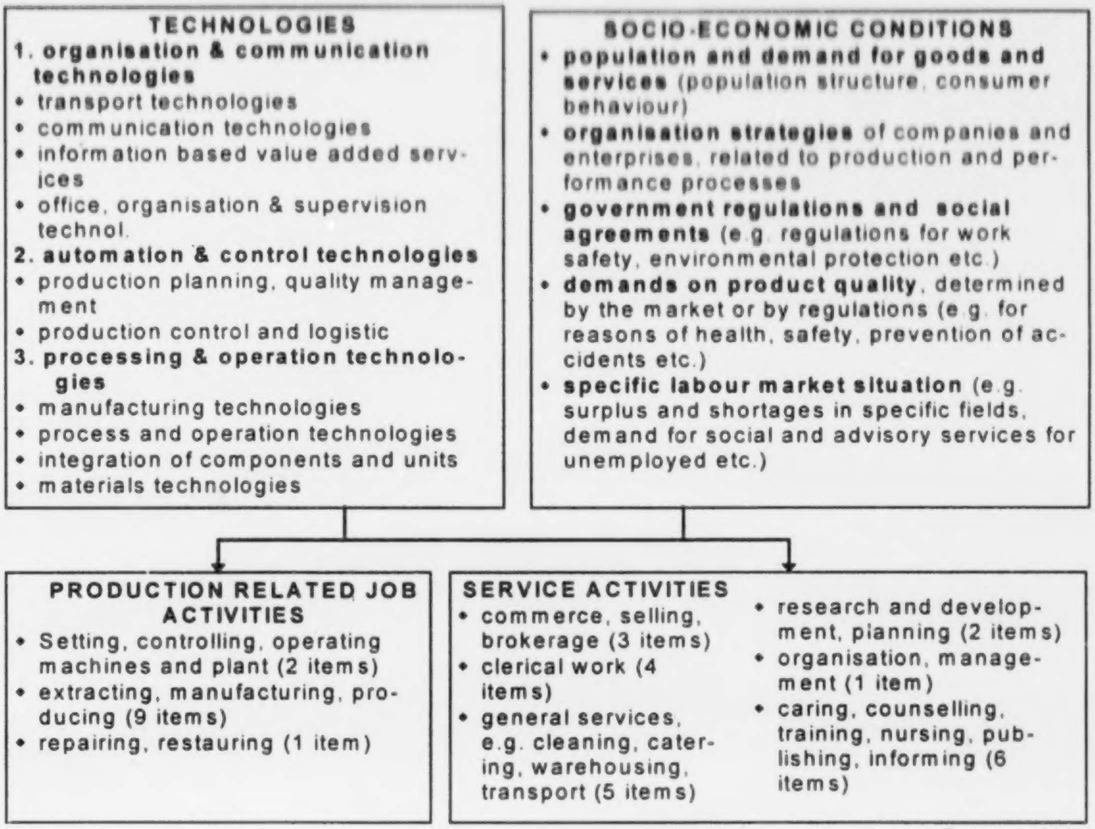
[34] These are mainly jobs with a high intensity of highly qualified manpower, e.g. R&D, management, executive tasks, computing, consulting, health and other care, teaching, informing, and the like.

[35] Recent employment figures indicate an even faster than predicted employment growth for workers with higher qualifications (Reinberg 1997).

Figure 14:

Socio-economic factors of influence on future work activities



TECHNOLOGIES

1. organisation & communication technologies
- transport technologies
- communication technologies
- information based value added services
- office, organisation & supervision technol.

2. automation & control technologies
- production planning, quality management
- production control and logistic

3. processing & operation technologies
- manufacturing technologies
- process and operation technologies
- integration of components and units
- materials technologies

SOCIO-ECONOMIC CONDITIONS
- **population and demand for goods and services** (population structure, consumer behaviour)
- **organisation strategies** of companies and enterprises, related to production and performance processes
- **government regulations and social agreements** (e.g. regulations for work safety, environmental protection etc.)
- **demands on product quality**, determined by the market or by regulations (e.g. for reasons of health, safety, prevention of accidents etc.)
- **specific labour market situation** (e.g. surplus and shortages in specific fields, demand for social and advisory services for unemployed etc.)

PRODUCTION RELATED JOB ACTIVITIES
- Setting, controlling, operating machines and plant (2 items)
- extracting, manufacturing, producing (9 items)
- repairing, restauring (1 item)

SERVICE ACTIVITIES
- commerce, selling, brokerage (3 items)
- clerical work (4 items)
- general services, e.g. cleaning, catering, warehousing, transport (5 items)
- research and development, planning (2 items)
- organisation, management (1 item)
- caring, counselling, training, nursing, publishing, informing (6 items)

source: Prognos 1996

The authors draw the conclusion that, also in the light of recent developments, the shift from unskilled to skilled job activities as a consequence of technological and socio-economic influences continues unchecked. Production-related jobs and some clerical and general service jobs will even retrench more than predicted in the late eighties. The shift from production-related to service-related jobs is expected to continue in the medium and long term. The intensity of this displacement effect should be even higher than in past years.

A projection of the structure of manpower demand by sector, occupation and qualification carried out by Weißhuhn/Wahse/König (1994) covers the period 1990 to 2010. An adaptation scenario was calculated for East Germany.

The projection of the *sectoral* labour demand again finds that the tertiary sector will experience quantitative growth to the detriment of the primary and secondary sectors in West Germany. The structure described by the adaptation scenario for East Germany in 2010 is comparable to the western one. If the general trend of the projection does indeed prove accurate we can get a feeling for the enormous adaptation process the east will have to cope with in the years to come.

The forecast by *occupations* results in a similar scenario: a decline in the occupations in agriculture, production and manufacturing and expansion of service occupations, in particular personal, consumption and production related services.

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A look at the *qualification structure* of the main sectors of the economy reveals several trends. The number and percentage of workers without vocational training is falling in all sectors. There is also a marked reduction in demand for unskilled workers in the tertiary sector, specifically in public services. The growing trend towards employment in the (private) tertiary sector also favours workers who have completed vocational training. Surprisingly, the secondary sector - the former stronghold of skilled workers - offers them only a minor job increase.

The above-mentioned projections for the qualification demand[36] were supplemented by specific manpower supply projections worked out by the State Federal Committee for Educational Planning and Research Promotion (BLK 1994).

The results indicate that the new supply of unskilled workers will exceed demand and thus will lead to a substantial deterioration in their employment opportunities. On the other hand, the future demand for craftsmen will exceed the future fresh supply and could thus cause shortages of this qualification level. For higher qualified persons (Fachhochschule, university), the new supply could exceed demand to a greater or lesser extent depending on the projection variant calculated *(table 6)*.

Table 6:

Demand change, replacement and recruitment demand, new supply of the labour force[a] by levels of qualification up to 2010 (West Germany; in 1000)

qualification	stock in 1991	demand 2010[b]	demand change 1991-2010	replacement demand[c] 1991-2010	recruitment demand 1991-2010	new supply[d] 1991-2010
	1	*2*	*3 = 2 - 1*	*4*	*5 = 3 + 4*	*6*
unskilled [e]	5.601	2.837	- 2.764	3.024	260	1.248
with completed training	18.677	20.509	1.832	8.634	10.466	9.073
Fachhochschule	1.127	1.567	440	464	904	1.534
university	2.257	3.111	854	844	1.698	2.058
total	27.662	28.025	363	12.965	13.329	13.910

[a] without workers in apprenticeship training - [b] according to the projection of Tessaring (1994) - [c] according to BLK 1994 - [d] according to BLK 1994 - [e] persons without completed formal training - [f] with completed apprenticeship training or training at vocational schools, trade & technical schools

sources: BLK 1994; Tessaring 1994 (medium variant)

However, BLK expects that qualified workers on the intermediate level will increasingly hold jobs which were previously filled by unskilled workers. On the other hand, university graduates or, in particular, "Fachhochschul"-graduates will be entering some segments of the labour market which were previously occupied by people who have completed initial or further continuing training.

5.2.3.5 *Finland*

Occupational and qualification forecasts in Finland are carried out by the Finnish Council of Educational Planning since 1976. The recommendations of the Council, in particular those concerning the future job openings, serve as a basis for the planning and development of education and training and the funding of the different institutions. The results of a forecast of manpower demand by occupational group[37] (Poropudas 1994) are shown in *figure 15*. According to this projection, agricultural and technical occupations will be retrenched considerably. Service and clerical occupations will more or less stagnate whereas expert work is expected to increase its share within the whole labour force significantly.

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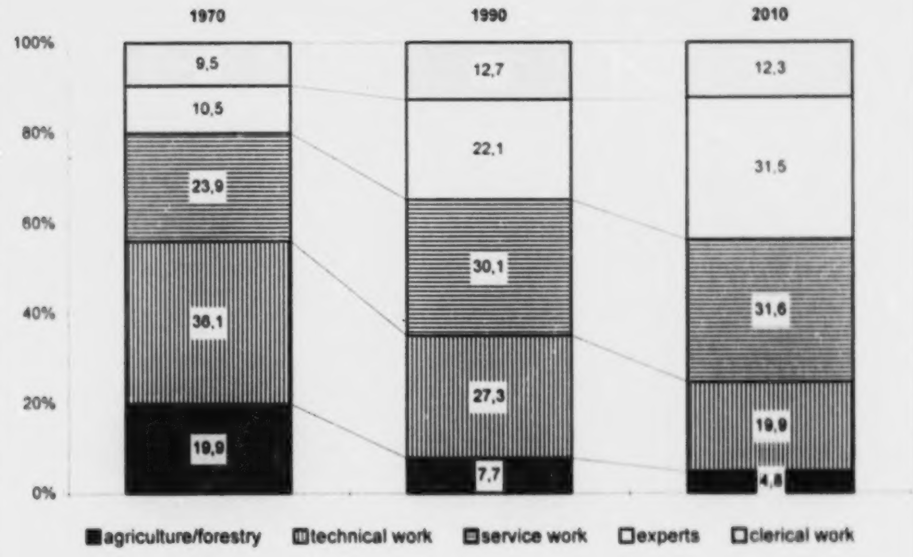
[36] by Tessaring (1994) and Weißhuhn et al. (1994).

[37] The Finnish classification of occupations also includes some qualification characteristics.

Figure 15:

Manpower demand by occupational groups, FIN 1970 - 2010 (%)



source: Poropudas 1994

A report compiled by the Finnish Labour administration (Työministeriö 1996) evaluates the short and long-term trends in the supply and demand of labour to the year 2010, with additional projections up to 2030. The report addresses several problems the Finnish economy is confronted with: the rise in unemployment in the early 1990s, the impacts of international upheavals and of European integration, the demographic development and the changing sectoral and occupational structure of employment.

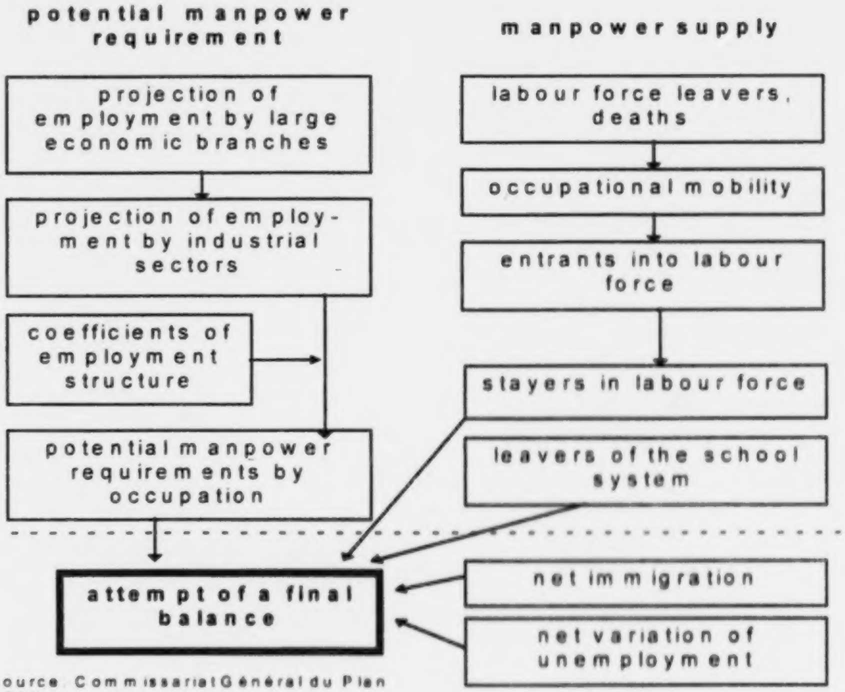
The report concludes that economic growth will be increasingly reliant on professionalism, specialised expertise and more efficient and less wasteful use of resources. This effectively marks a shift towards the information society, promoting greater productivity, efficient use of capital, sustainable use of natural resources and more labour-intensive production. (Työministeriö 1996, summary)

5.2.3.6 France

Within the framework of the General Planning in France, the potential jobs (manpower requirements) and workers (supply) are projected (Commissariat Général du Plan 1991, pp. 60 ff.). The procedure of the forecasting model is illustrated in *figure 16*.

Figure 16:

Model of forecasting manpower requirement and supply within the General Plan, France


potential manpower requirement
manpower supply
projection of employment by large economic branches
projection of employment by industrial sectors
coefficients of employment structure
potential manpower requirements by occupation
labour force leavers, deaths
occupational mobility
entrants into labour force
stayers in labour force
leavers of the school system
attempt of a final balance
net immigration
net variation of unemployment

source: Commissariat Général du Plan 1991

The forecasting model concerning the occupational and educational structures of jobs and labour supply operates largely with trend extrapolations. For the projection of the manpower requirement, changes in productivity and in the volume of work are estimated and broken down by major industrial sectors; basis is the planned growth in production. Within each sector the occupational structure is extrapolated by trend. Result is the number of job offers in all occupations.

The future manpower supply is calculated independently assuming that the trends of past flows and transitions through education, training and employment will remain unchanged. The projected supply figures serve as an indicator for the training needs and-are confronted with the demand forecasts.

The planification of the future scope and structure of education and training takes into account the manpower needs. It is assumed that neither occupational mobility nor continuing training will be capable to correct imbalances to a greater extent than they have done in the past.

An earlier projection of total qualification requirements in France up to the year 2000 was carried out by BIPE/Haute Comité d'Education Economie (1987, cit. in Rajan 1989).[38] The results show a decrease in agricultural occupations and a significant increase in civil service, teaching, managerial and other service occupations. Another finding was that the educational level in all occupational groups will change in favour of high qualifications - irrespective of the growth or decline of this occupation *(figure 17).*

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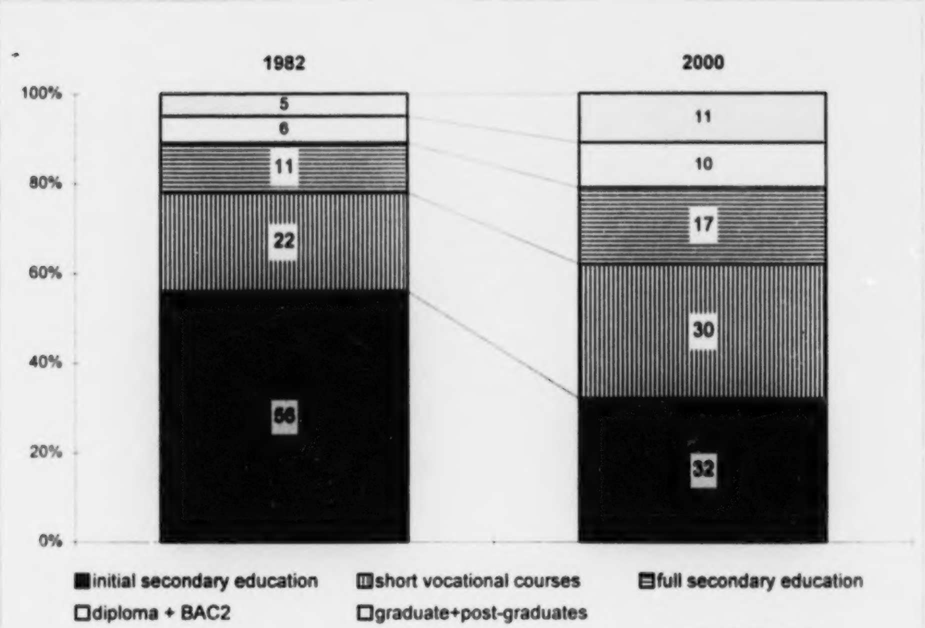
[38] Currently a forecast of manpower supply and demand by levels of qualification is being carried out on behalf of the French Ministry for Labour, Employment and Vocational Training. Results are expected by autumn 1998.

Figure 17:

Manpower demand by qualification, F 1982 - 2000 (%)



source: Rajan 1989

This would mean that by the year 2000, 37% of the labour force will need higher educational levels, compared to 22% in 1982. Although the educational system has already responded - e.g. by creating more vocationally-oriented qualifications, by reinforcement of enterprise-based training and by the spreading of open learning - education and training policy is asked to improve basic education as a basis for life-time learning, to encourage the inclination to learn and to offer due recognition for educational achievement in the labour market.

A recent scenario built by BIPE Conseil (Aguettant/Ait-Kaci 1997) confirms these former projections on the whole. Although a considerable increase in employment for the whole economy is expected in the years up to 2005[39], the net change in employment is expected to be negative for agricultural workers and unskilled blue-collar workers. Concerning the job prospects of graduates from education and training in the years to come, a significant increase in qualifications required of young people is to be expected.

Since overall job offers for young people (550 000 to 650 000 per annum) will be insufficient for the number of graduates (around 760 000 in the year 2000) the integration of school and training leavers into working life will continue to be difficult.

The authors conclude: "The major risk for the years to come is the global insufficiency of jobs offered to young people and not a structural imbalance between the needs of the economy and the people leaving the educational system. Those with the lowest training levels will be most affected by unemployment. In view of the threat of persistent unemployment tendencies towards a prolongation of initial education and training may continue..." (Aguettant/Ait-Kaci 1997, p. 8)

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[39] On the assumptions of a reference scenario (GDP growth of 2% p.a. in the period 1996-2005), employment growth would be 0.8% p.a. or + 180.000 jobs.

5.2.3.7 Denmark

In Denmark, since the early 1980s DTI Human Resources Development has been engaged in qualification requirement studies related to specific industrial sectors or to specific technologies. However, quantitative and structural forecast results for the entire economy comparable with those discussed above, are not available.

"The pragmatic setting of the qualification requirement studies performed by DTI/HRD has been to develop tools for effective training and employment policies. ... An important characteristic of what has been referred to as first generation studies is work observations registrating which tasks were in fact performed, which tasks constituted a job, described by means of a specific taxonomy.

The second generation of analyses integrated the work function analysis with the curricula development and the innovation and renewal of the VET-system, but still with the client, i.e. the responsible committees.

The third generation of analyses is the action oriented demonstration projects suggesting combined action of employee education and training and change in work organisation. ...

Qualification analysis approaches must of course fundamentally accept that changes in work organisation and CVT are necessary for the enterprise and for their employees in order to increase productivity. Still, there are some vital needs for the workers, e.g. that their qualifications should ensure employment also in other enterprises than the one they actually work for - be in the same sector or outside it. And a worker interest in some more broad, personal and societal qualifications to be able to cope with modern life and to be able to make choices and exert influence on one's own fate." (DTI 1996, pp. 31 f.)

6. CONCLUSIONS

The transition from Taylorism and industry-based economies to post-industrial, information and knowledge intensive societies imposes new challenges for work and skills. They may lead to self-reliant, flexible and holistic patterns of work - but also to increasing instability and social exclusion of those people which cannot keep pace with increasing job requirements. In this context, a new definition of work and skills and increasing efforts to reduce unemployment and inappropriate use of skills are needed.

Concerning the question about whether new jobs and appropriate policies could open the way to substantially reduce unemployment, it is obvious that there is neither an *automatic* relationship between economic growth and employment growth nor between job increases and a reduction in unemployment, although in some countries and periods these linkages have been observed empirically.

Furthermore it cannot be expected that - in the short or medium-term - economic and employment growth could be stimulated solely by investments in education and training. But it also becomes clear that *without* complementary measures to combat structural and long-term unemployment and to enhance skills, in the longer term economic and employment growth will be hampered by the inappropriate quality of the workforce and by high social costs.

Looking at the forecasts of future employment structures in industrial sectors, occupations and at the qualification requirements of jobs in several EU countries, it becomes obvious that despite different methods, delimitations and educational systems, the forecasts illustrate that structural change in industry and society goes hand in hand with a major increase in the requirements of the work force. Individuals with a low level of or no vocational qualifications, who already face the most difficult problems on the labour market today, will probably have little chance of finding stable and promising employment in future.

However, the future development of employment amongst those with intermediate qualifications, i. e. people who have completed initial in-school or in-plant training, is assessed differently in some cases. All forecasters emphasize that on this level considerable substitution processes are to be expected and that these qualifications are viewed as problematic unless they are made more attractive. Parity of esteem for practical and theoretical education and training can best be achieved in employment in respect of income, appropriate employment, career prospects and further training opportunities.

All in all, however, our knowledge and methods in anticipating future trends are (and will always be) limited. Progress in forecast research should concentrate on, among other things, the following aspects, which are not yet sufficiently treated in forecasting:

- analyses of the mechanisms and factors which influence specific segments of the labour market;
- more detailed analyses of the "problematic" and "key sectors" of the economy, in particular private services, public sector and technology-intensive manufacturing;
- development of concepts and of ways of considering occupational mobility of workers (supply side) and the occupational flexibility of jobs (demand side) in forecasting, and how these match one another;
- supply and demand forecasts are mostly calculated independently from each other, although research has revealed close interactions between both. It would be an important task for forecasters to consider these interactions and feedbacks more closely although this may be extremely difficult from a methodological point of view (e.g. considering income and behavioural components, different time gaps of feedbacks, individual choice and recruitment behaviour, etc.);
- taking into account the "European perspective", both within national forecasting and in a European forecast activity.

Policy is asked:

- to offer sufficient educational opportunities to ensure that the individual can enter and complete an appropriate training course;
- to identify an individual's insufficient or mismatched qualifications;
- to implement educational offers which take account of the structural change in the labour market and employment;
- to create equal chances for general/theoretical training and for practical training and to improve the permeability between the different education and training courses;
- to offer sufficient further training courses to minimise the risk of unemployment or to facilitate the possibility of a re-entry into working life.

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INFORMATION NEEDS FOR INDIVIDUAL CAREER DECISIONS

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1. INTRODUCTION

This report is based on empirical studies conducted by the research group consisting of the *Fachhochschule* (Higher Technical College) of the Federal Labour Office, Mannheim, the University of Mannheim, Chair for Educational Sciences II, and the German Institute for International Pedagogical Research, Frankfurt. The main areas of focus are comparative guidance science, media research in vocational guidance, curriculum research with reference to the qualification of vocational counsellors, vocational guidance in the EU and in the Central and Eastern European countries.

2. PRESENTATION OF THE PROBLEM

The White Paper of the European Commission "Teaching and Learning - Towards the Learning Society" (1995) stresses the importance of lifelong vocational flexibility and the need to prevent the marginalization of social groups. These demands originate from the increasingly rapid changes in occupational requirements and their spectrum of activities and from the need for vocational re-orientation and greater mobility both at the national and international level - a factor which also has its impact on the status aspect of professional activity.

The White Paper (p. 16) names two basic conditions which appear to be necessary if individuals are to be able to exercise responsibility in building up their abilities:

- adequate information and guidance
- access to training with all the opportunities available for mobility.

But, it also criticizes information facilities, especially the information on training provision, and the lack of clarity and comparability. "The citizen of Europe bas better information when choosing a hotel or a restaurant then when choosing a type of training."

In order to improve orientation to demand, and especially the transparency of supply, it is proposed to set up "knowledge resource centres" which could "act as an interface between the supply of and demand for information on training."

Three central tasks in information management have to be fulfilled by these centres:

a) Development of sound and comprehensible assessment and evaluation methods which will make it possible to establish the real contribution made by training to employability.

b) A forecasting method at European level which will make it possible to know how occupations will develop and what skills will be required.

c) The elimination of certain attitudes so that social origins do not continue to impede social advancement.

But the improvement envisaged by the European Union Commission faces a number of obstacles.

The historical development of economic and social structures has led to great differences between guidance, support and information systems in the field of vocational training. These differences are to be found in conditions of access, level of provision, target group orientation, the volume of services, qualification of the staff and methodology (cf. Watts et al. 1993, Ertelt 1989).

Moreover, there are differences in occupational structures, in the orientation to specific job profiles and their requirements, formulated qualification requirements and recognition of certificates. In this connection, one only has to think about the importance of the dual system of vocational training in Germany.

But, however great these systemic differences may be, the career problems of the individual citizens are surprisingly similar in this age of growing international linkages. In every country similar problems are to be found in transition from the school system to the training and employment system, in the loss of self-esteem in the case of unemployment or underemployment, in the occupational integration of the socially disadvantaged, in the possibilities for women to return to their professions, in the support for refugees and foreigners, and in the reduction of class barriers for social advancement.

The approach selected in our research work is the further development of guidance and information systems oriented to the affective-cognitive assimilation and processing of information in the efforts of the individual to solve his career problems. The approach analyses the processes at the interface between individual demand for information and the guidance and media supplied. The focus is not on a possible expansion of this supply but optimization of the systems in terms of vitalizing demand and creating an information marketing system geared to the internal conditions of the users.

Studies have shown that in vocational guidance, information processing by the client is, on the average, less pronounced than the information activity of the guidance counsellor. This implies the permanent danger of information overload with all its negative effects such as loss of image of the guidance counsellor, a drop in the quality of individual decisions and fragmented assimilation of information (cf. Ertelt 1989c).

Vocational information, in the context of heuristic information-structural guidance, mainly has the function of "vitalizing" information demand in correlation with gaps in factual, valuative and prescriptive information at the decision-making levels.

A differentiated supply of vocational information should be provided on the basis of systematic user research which is not only directed to type and volume of demand but also covers users' search heuristics. Here an ideal-typical distinction can be made between client-related and counsellor-related systems. Another absolutely essential differentiation of vocational information must be made in terms of its function in the preparatory pre-guidance, accompanying on-going guidance and post-guidance systems. Apparently, the explanatory material and written information collected during the guidance interview or specially compiled for later study at home has proved to be very valuable for the design of the client's learning processes (cf. Ertelt 1992, p. 104).

Computer-assisted career guidance (CACG) systems are becoming increasingly important because they can perform different functions and are extremely flexible in the field of career information.

At present a multitude of such systems has invaded Europe and the USA. They may be subdivided into:

a) database systems for education, training, occupations, jobs;

b) planning games and career simulation to discover the specific areas of activity through experiential learning;

c) matching systems which match individual characteristics and occupational profiles;

d) decision aids for the analysis and promotion of individual decision-making processes;

e) self-assessment profiles which normally contain a list of questions on career interests and classify the responses in occupational families;

f) psychometric tests, normally available as paper/pencil versions on skills, aptitudes, personality, etc., which are used and evaluated on-line;

g) programmes providing job-seeking aids and skills;

h) self-teaching test programmes which help in drafting curriculum vitae and application letters.

(cf. Offer, 1993, p. 40 f.; Watts, 1993, p. 68 f.).

Transnational, computer-assisted procedures are gaining importance in the European Union in the field of career guidance for young people (European career guidance centres, originally supported by the PETRA programme) and job placement (EURES).

However, the use of computer-assisted guidance systems is being greatly hampered by a number of problems. Apart from limited availability, inadequate quality standards, many misunderstandings on the part of the user with regard to objectivity and validity and inadequate training of staff, the main shortcoming is inadequate integration in the guidance services (cf. Sampson 1993, p. 46 ff.; on this subject also: BA (ed.) 1993; cf. Rayman 1990, p. 225 ff.; Isaacson 1985, p. 327 ff.; Ertelt/Schulz 1997).

In the following, the survey methodology for the analysis of information demand for career problem-solving processes and its empirical implementation in career guidance is presented.

This is followed by some requirements for the design of information supply and further research work including transnational and multi-cultural aspects.

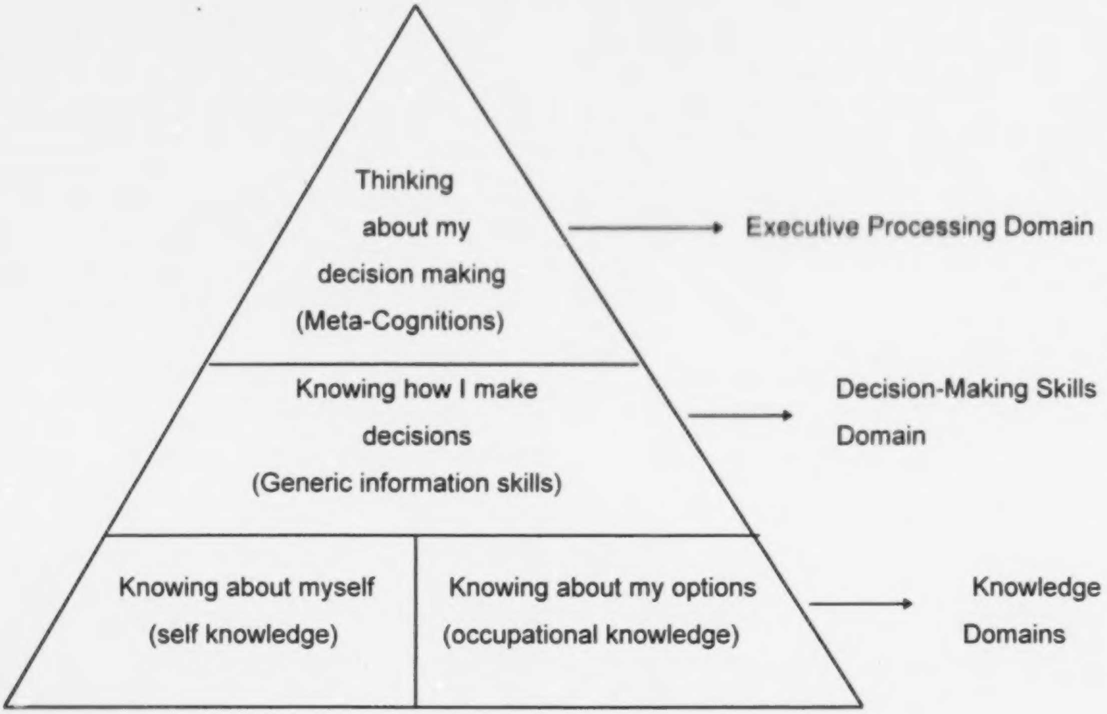
3. RESEARCH METHODOLOGY FOR INVESTIGATION OF INFORMATION DEMAND

The ideal type of a career decision and problem-solving process may be divided into a pre-decision, a decision-taking and a post-decision phase, each one with characteristic information activities. An individual needs information on alternatives, on ways and means of "satisfying" them and their chances of being put into practice (factual premises), assessment criteria which are the result of his conceptions of himself in comparison to internalized career-related environmental conditions (valuative premises), and personally committing process information which indicates what and how much and in what way factual and valuative data should be linked (prescriptive premises).

In their Cognitive Information Processing Approach (CIP) Peterson et al (1996, pp. 444) present the processes taking place during career decision and job selection in the form of a pyramid.

Figure 1:

Information processing domains in career decision making


Thinking about my decision making (Meta-Cognitions)
Executive Processing Domain
Knowing how I make decisions (Generic information skills)
Decision-Making Skills Domain
Knowing about myself (self knowledge)
Knowing about my options (occupational knowledge)
Knowledge Domains

We put *Self-Knowledge* about own values, interests, abilities and preferences for certain educational paths and careers in the category of valuative premises.

Occupational-Knowledge covers knowledge such as, what training and experience is required for a specific occupation, what a typical working day is like, what differences there are between workplaces in companies, what stress, working conditions and income potential exist, etc. In our system we subsume this type of information under factual premises.

The *Decision-Making Skills* (Generic information skills) are operationalized with the CASVE Cycle by Peterson et al.

Communication (C) means perception of a need for action because of a problem situation caused by external or internal factors.

This is followed by *Analysis* (A) of the components involved in the problem, Self-Knowledge, Occupational-Knowledge, Generic information processing skills and Metacognitions.

In *Synthesis (S)* a number of possible action alternatives are developed (Elaboration) and then an overviewable number of options (3-5) are crystallized (Crystallization).

This is followed by an assessment of the costs and benefits *(Valuing=V)* of each single option/alternative in terms of oneself, other important persons, the cultural reference group and the surrounding society. On the basis of the priorities derived from this, the individual makes his first choice and substitute choices.

Execution (E) means formulation of a plan to execute and evaluate the first tentative choice.

The *Metacognitions* contain superordinate thoughts of the individual on his decision making process. Examples:

Self-talk: "I'll never be able to make a good career choice"

Self-awareness: "I'm getting very scared about this"

Control and monitoring: "I need help in making this choice"

We put Decision-Making Skills and the Metacognitions under prescriptive premises.

Of the obstacles at the interface between information supply and demand mentioned in the European Commission's "White Paper" (1995, p. 17), the first two fall within the factual domain and the third within the valuative domain.

The following factors play a decisive role in the development of demand-oriented information activities: knowledge of the impact of the decision-making problem on an individual (involvement), the structure of problem definition and objectives, the approach to problem solution (heuristics) and the limits of capacity to absorb and process information.

It is surprising that, even today, guidance and information systems are mostly oriented to the normative model of rational decision which mostly neglects individual conflicts and emotions and which, furthermore, implies information overload.

In contrast, we take the descriptive model of open, heuristic problem solution as the basis. It takes account of the fact that an individual approaches problem solution step-wise through an exploratory search and simplification strategies, takes only a few alternatives into consideration and only seeks a few criteria for their assessment. Definitive commitments are postponed as long as possible in order to be able to include new information.

For Walsh (1990, p. 270) all models for career path counselling start implicitly or explicitly from a graduated process of individual problem-solving and decision making. Here the danger arises that rational concepts with normative demands on information activities and approaches will be re-introduced via these - conceived as ideal/typical - phases and stages of the individual decision-making process.

It should always be kept in mind that career problems are often of a complex nature and poorly defined. They are generally coupled with strong emotional involvement. The solution processes have an indefinite outcome, i.e. there is no solution guarantee, they take place under conditions of incomplete information and are influenced by feelings of reactance and dissonance (cf. Peterson et al., 1996, p. 428 f.).

The quality of a demand-oriented guidance and information system depends on the degree to which it can adjust to individual cognitive-affective information-assimilation processes, i.e. can simulate them. In this sense, concepts like the CASVE Cycle of Peterson et al. or the following phase and stage sub-division, are diagnostic instruments for the identification of the stage in the individual decision-making process, in order to be able to provide the most helpful information. If a person is facing a *problem situation*, caused for instance through dismissal from school, unemployment or failure in education and training, he needs information which will help him to define the new situation confronting him and to know which type of decision is required, show him the disadvantages of non-decision and inform him of the necessary approaches and the information to be expected.

After that, aids for the *generation of action alternatives* have to be provided, whereby the essential feature is not the largest possible number of alternatives, but an exemplary selection.

At the stage of *assessment of action paths* he needs information from which he can derive the relevant value criteria to assess the instrumentality of an alternative for the attainment of individual goals.

In the *decision phase* with a personal commitment to an alternative he needs information which informs him about his own decision-making abilities, selection and commitment conflicts, fear of loss and chances of attainment.

Finally, descriptive, reinforcing and interpretative information is required to overcome the characteristic dissonance experiences of the *post-decision phase*. What is particularly important in a new vocational training course or job is aid for interpretation of attribution patterns for success and failure so that the successful implementation of a decision is not undermined by hasty reactions.

4. RESEARCH RESULTS

The results of four empirical studies will now be presented. They cover the different aspects of the information activities of career problem-solving processes.

4.1 Study on typical counselling issues

In the first study (Mauch, 1986) the content of 62 counselling interviews for career decisions (with young people and adults) were analysed to establish the deficits of the clients in terms of factual, valuative and prescriptive (process-related) information or premises.

Six problem types were established, whereby in addition to clearly "pure" types (63%) a number of overlapping types, i.e. "mixed types" (37%) were found. Every problem type is characterized by a specific deficit of factual knowledge (knowledge of alternatives and ways and means of "satisfying" them), valuative knowledge (criteria) and problem knowledge (decision heuristics of the individual).

The *Criteria - deficit - type (Type C / 35.5%)* consisted of clients who knew about action alternatives, but could not weight them for lack of assessment criteria and therefore had not reached a decision yet.

Clients with *deficits in information for Realization (Type R / 32%)* had already selected an alternative. Sufficient criteria were also available, so that the assessment of the alternatives had already led to a personal commitment. What was still needed was information for realization or implementation of the decision.

The *Alternative - deficit - type (Type A / 11%)* included clients who had no or very few ideas of possible action alternatives. But they had criteria for the definition of solution approaches (e.g. career expectations, interests, dislikes) and knowledge of further approaches for problem solution (prescriptive premises).

The *Orientation - type (Type O / 10%)* consisted of clients who after a rupture in the continuous flow of their lives (e.g. dismissal from school, unemployment, accident, divorce) had to find a new orientation. Here alternatives were being sought and the sphere of solution was being delineated anew with the aid of criteria. In addition, new solution methods had to be found.

Clients belonging to the *Uncertainty - type (Type U / 6.5%)* did not have adequate career alternatives, their interests were highly diverse, sometimes even contradictory; furthermore, they displayed uncertainty with respect to the approaches for problem solution.

The *Prescription - deficit - type (Type P / 5%)* subsumed clients who were uncertain about their approach for problem solution, or who hoped that counselling would give them confirmation that they had taken the right decision.

For more than one-third (37%) of the deficits discovered in the counselling interviews, the classification was undertaken on the basis of the relatively most frequent deficit. This may be taken as a warning against too-hasty categorization in types or labelling of the concerns of the clients. Furthermore, the affective area was only taken into consideration indirectly, e.g. through the problem pressure and the degree of involvement of the client.

In order to substantiate this typology with due consideration of counselling interaction variables, the content-analytical evaluation procedure was combined with a cluster analysis. The cluster analysis was oriented descriptively to the formation of the most homogeneous groups on the basis of their similarity in terms of a number of variables.

In a first step the centroid-cluster-analysis applied here took account of the career domain, i.e. the career alternatives mentioned during the counselling interviews (part of the factual premises). Two variables were taken to have a better estimate of the client's information structure in this area:

a) *Initiative* in introducing career action alternatives in the interviews (client or counsellor?).
b) Number of career alternatives introduced (*Variability*).

In order to identify possible impacts of the counselling approach, the interviews were divided into a starting, intermediate and end phase.

From the combination of "Initiative" and "Variability" three types of interviews (cluster) were derived:

Type 1: High level of initiative, measured in the number of occupational alternatives introduced by the client, low concentration on one specific occupation and medium variability of occupations mentioned (share of very diverse occupations).

This type of interview reflects - within limits - the thought of the client in alternatives. *Type 1* is similar to *Type K* which sees various alternatives but cannot appraise them against one another for lack of valuative premises.

Type 2: In the starting phase high concentration on one occupation with concurrent lower initiative of the client and higher initiative of the counsellor (i.e. the counsellor introduces the different occupational alternatives). In the end phase of the interviews the variability of the client rises.

Type 2 is comparable with *Type O*, where the client comes with few concrete ideas and wants the counsellor to tell him what paths are best for him. But this could also be a *Type R*, where the client realizes during the counselling interview that the occupation he favours cannot be put into practice and he now wishes to discuss other alternatives.

Type 3: Concentration of the client on certain leading occupations with medium initiative and high variability in all phases of the interviews (i.e. the share of different occupations in the total number of alternatives introduced by the client and the counsellor). *Type 3* is difficult to classify; it can be compared both with *Type R* and with *Type K*.

For the further development of the problem typologies of concerns with the aid of cluster analysis, it seems absolutely necessary - given these results - to take account of interaction processes also in terms of valuative and prescriptive information.

4.2 Study on the linkage of decision-relevant information in counselling

In another study (Hick, 1992) with the same decision-theoretical background, the focus was on the linkage of factual, valuative and prescriptive information during the interaction process of a problem-solving counselling interview.

Three procedures may be considered for the analysis of cognitive processes in individual problem-solving (cf. Gallhofer/Saris, 1989, p. 99 ff.): "Cognitive Mapping" (*CM*), "Empirical decision analysis" (*EDA*) and "Multiple path to choice" (*MPC*).

Here a modified thought-structure analysis was applied (Cognitive mapping, CM). The thought-structure analysis Cognitive Mapping (CM) concentrates on the problem definition phase and examines the premises and valuations which play a role in the explanation of events. The "cognitive map", that is, the cognitive structure of a person is viewed as a flow diagramme arising from these valuations. This modification was mostly concerned with consideration of the time scale of problem solution, which is not adequately covered in reality by the ideal-typical sub-division into phases and stages.

The survey was undertaken in the form of a case study based on 10 career decision counselling interviews (employment guidance: 5; vocational guidance: 5). The basis was anonymous tape-recordings from which written protocols were also prepared.

The results show that the linkage of factual, valuative and prescriptive information can be presented as a process in a network with different cycles and islands. Through this the evolution of the client's decisions and the outcomes expressed by the counsellor become visible, and so do the contents of interviews which have nothing to do with the overall context.

The great importance of prescriptive premises for the progress of the interview was evident. Clients who had a great deal of this information gave a very differentiated description of their concerns in the starting phase already, so that their problem could be defined with minimal language encouragement.

Clients with a high share of prescriptive information tended to paraphrase much more, i.e. they kept describing the problem in different words and could thus show the different facets of the problem in interaction with the counsellor without a strong shift of accent.

In the course of the interview, these clients not only asked more concrete questions, but through their own summaries and repetitions, they could memorize new information better and revert to it later. This led to a further increase of decision competence.

Together with this, there were interviews where the client deliberately kept his preoccupation very general and described it without any direct involvement. This "detachment" was an indication that the client hoped to get suggestions rather than binding answers. If the counsellor tried to activate the client and concretize the problem, this seemed to diminish the chances of success of the counselling.

In other cases the clients confined their concerns to individual questions, whereby the danger arose that these aspects could not be integrated in the overall context later. This phenomenon of "islands in the interview" is an indication that an unsystematic "hypervigilant" decision-making style prevails (cf. Janis/Mann, 1977, p. 196 ff.) or a previously established strong hierarchization of decision-relevant premises is being maintained.

Based on the presentation of the "problem cycles" in the counselling interview, two typical heuristic features of the client could be observed. In one there is a strong preference for a certain action initiative which is relatively resistant to constraints from outside. At the same time however, the criteria mentioned in this context are only of a general nature. If an effort is made to concretize the criteria for the alternative, there is a danger that the client is not yet ready to accept these relationships and "encapsulates" himself, or that he keeps referring to other aspects ("drifting criteria").

In the observation of the other heuristic feature, the client allows his problem-solving process to be guided by constraints such as labour market situation, poor marks in his certificate, apparently outdated qualifications, lack of job experience. In these "constraint heuristics" the abilities and interests of the client are relegated to the background. The client often asks the counsellor to name different occupational possibilities before the counsellor has had the possibility of appraising the client.

These findings permit the conclusion that the design of vocational information and guidance processes should pay particular attention to clients with deficits in the *prescriptive decision premises*. Because these premises determine the dimension and the linkage of the alternative and the assessment (criteria) in the decision making process. They cover both the individual decision logic and the decision-relevant metacognitions of self-guidance. Peterson et al. (1996, pp. 438) divide these metacognitions into "*self-talk*" (e.g. positive: "I know I can trust that my career decision will be the right one for me"; negative: "I'll never be able to make a good career choice"), *self-awareness*, i.e. self-perception and classification of "self-talk" as the basis for the corresponding reaction (e.g. "I'm appalled that I am not capable of making a good career decision!") and *monitoring and control*, i.e. assessment of suitability of the approach and volume of information for the individual problem-solving steps (e.g. "I have to get vocational guidance for the solution of my problem" or "There is no use trying to get more information on future prospects in this occupation because the forecasts are too speculative!").

4.3 Study on vocational information expectations and structures in guidance

In a large-scale innovation-monitoring study on vocational materials "Apprenticeship occupations as judged by companies" conducted by the Institute for Employment Research (IAB) of the Federal Employment Services (Seidel, 1995), other aspects of demand-oriented information for vocational decision-making processes were examined. Among other things, one subject of study was the links between the involvement of the client in the counselling interview, his information expectations and his subjective assessment of the supply of vocational information through the medium.

The focus here was on two aspects, firstly, information needs in relation to the development of person-related decision premises and secondly, information needs in relation to the development of occupation-related decision premises.

The survey was conducted in 70 Labour Offices (employment guidance and vocational guidance) and consisted of a standardized interview with the client *before* the individual counselling, observation of the counselling sessions, and a standardized interview with the client and the counsellor *after* the counselling. Altogether 135 counselling sessions were evaluated in this manner.

In the following *selected findings* are presented (cf. Ertelt/Möller/Schade/Seidel, 1997).

The basic pre-requisite for consideration and inclusion of information in the counselling is the involvement of the client; here the most important determinant is the *importance* attached by the client to the *interview*.

Almost 95% consider the anticipated counselling to be "quite important" or "very important". But there are very clear differences between adults (employment guidance *EG*) and youth (vocational guidance *VG*) in the "very important" category: EG 69,3%, VG 45%. For many employment guidance clients the counselling is of vital importance because financial questions of further training and re-training have to be discussed. This effect is, however, exclusively generated by women who expect special assistance from employment guidance services for their career problems.

Also with respect to the stage reached in the decision process, there are differences between *EG* and *VG* clients. One-fifth (21%) of *EG* clients are still at the beginning of the process, surprisingly more than in the *VG* group (15%).

In comparison to this, 50% of the young clients (*VG*) are at a stage where they are considering the pros and cons of different occupational alternatives (they have already narrowed down the sphere of possible solutions), whereas in the *EG* group this figure is 39%.

15% of *EG* clients and 17% of *VG* clients are already in the decision-making phase; 25% of the *EG* group and 18% of the *VG* group have reached the post-decision and implementation phase.

The large segments of those who have already taken their decision when they come to the counselling interview provide important indications on information management which, apart from preparation of the decision, also has to include confirmation or acceptance of the decision and its implementation.

In order to cover the dimensions of information demand, the contents of client expectations were subjected to a factor analysis. Four clearly interpretable factors emerged (which explains the 67% variance):

Factor 1 represents criteria information to assess occupational alternatives

- advantages and disadvantages of certain occupations
- opportunities and risks of certain occupations on the labour market
- where are the own occupational strengths?

Factor 2 contains the desire for information for *definition* of the own occupational *problem situation*, for further steps to be taken and possible obstacles in training and professional activity.

Factor 3 covers the desire for information on occupational *flexibility, mobility* and corresponding aids from the Labour Office.

Factor 4 bundles information wishes relating to confirmation of the decision and its implementation.

The analysis showed that information needs before the counselling sessions were determined by gender, the type of counselling (vocational guidance for youth and employment guidance for adults) and the current status of the decision-making process:

- female clients wished to get information on problem definition more than male clients (Factor 2).
- clients who had not yet decided expected information on criteria to assess alternatives more than those who had (Factor 1).
- clients who had already decided wished to get more information for confirmation of their decision and for implementation (Factor 4).
- adults had more questions about occupational mobility and financial aids from the Labour Office than young persons (Factor 3).

The next step was to examine how far the existing medium (MatAB[1]-questioning of experts) could meet these information requirements in the different subjects, i.e. to what extent they were demand-oriented.

It was seen that the wishes of the clients represented in Factors 1 - 3 could be met sufficiently but not the aspects bundled in Factor 4.

The surveys *during* and *after* the counselling provided a number of further indications which were important for information management.

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[1] MatAB: Materialien aus der Arbeitsmarkt- und Berufsforschung <Materials from labour market and occupational research>; the series, edited by the German Institute for Employment Research contains information addressed also to the vocational guidance of the Federal Employment Services in Germany.

For instance, adults - much more than expected - showed career selection patterns oriented to apprenticeship occupations which are otherwise only to be seen in models for the very first career choice. In view of this, there is little justification for the differences to be found in the information and guidance methods for employment guidance and those for vocational guidance.

This also appears to be unnecessary for another reason, because the findings also indicate that young persons already in the course of their very first career choice and before completion of their vocational training think very intensively about the later labour market situation and the occupational flexibility required. They are very clearly aware of the fact that they are in a transitional phase.

Further results showed that counselling could often assist the individual decision- making process, but it should not be forgotten that precisely this state of indecision between occupational alternatives could not be overcome in 60% of the cases. The fact that 33% of the clients who had already made a decision, reverted to the stage of examining alternatives once again, does not necessarily have to be considered a step backwards.

Another critical feature in terms of demand-oriented information activity is that the counsellors seem to have a rough idea of the stage their clients have reached in the problem-solving process, but they do not seem to have very definite knowledge of this. There should be better conformity between the self-assessment of the client and the assessment of the counsellor.

Because of this, the fundamental pre-requisites for effective demand-oriented information management in guidance are often missing.

4.4 Survey of information needs and media use by clients and staff of the vocational guidance services of the Federal Labour Office

Within the context of the recently completed evaluation study of the media used by the vocational guidance services of the Federal Employment Services (Seidel, 1997), the decision-theory model of information management in guidance could be differentiated further through a representative sample.

The following selected findings are based on statements made by 1,053 clients, 1,068 counsellors, 244 teachers and 251 employers, which were collected through standardized interviews (in autumn 1996).

The expectations of the clients from the counselling in the Labour Office or from a visit to the Vocational Information Centre (Berufsinformationszentrum - BIZ) indicate a high level of involvement. Almost 90% described this visit as "quite important" (48%) or "very important" (40%). Differences arise according to the decision-making phase. Clients who expect implementation assistance find the visit to the Labour Office/BIZ significantly more important.

As far as the stage they have reached in the decision process is concerned, some 17% of the clients are still at the beginning (Stage 1), one-third has already several alternatives but is still weighing the pros and cons (Stage 2). Some 23% have already decided but wish to get more backing for their decision (Stage 3). One-quarter expect assistance in the implementation of their decision (Stage 4).

With regard to the most used information sources, friends/acquaintances and the family play a special role - as already seen in earlier studies. This is followed by the BIZ and newspapers/magazines, and at a lower level by documents from the Labour Office, vocational guidance and the school.

But, here too, there are differences in preferences depending on the stage reached in the decision process:

- Friends/acquaintances: Stages 1 - 4, especially Stage 2
- Family (parents/spouse): Stages 1 - 3
- Vocational Information Centre: Stages 2 and 3

- Employment guidance: Stage 4
- Vocational guidance: Stages 3 and 2
- School/teachers/university: Stage 3
- Labour Office documents: Stages 2 and 3, also 4
- Newspapers: Stage 4

The answers to the question of the most important subjects for the individual strongly reflect the present economic situation: The subjects at the top are "situation on the training place market or the labour market for certain occupations", "pre-requisites and requirements for training / continuing training / occupational activity", "financial aid for training / continuing training in the case of unemployment or entry into work".

Of the subjects offered, interest in training, practical training or work in other countries is last on the list.

Altogether 9 of the 13 subjects listed were classified as quite important to very important by the clients, an indication of the great need for different types of information which results from a differentiated view of the problem.

Together with this a discriminance analysis displayed the connection between the stage reached in the problem-solving process and the demand for vocational information (as represented in selected media of the Federal Employment Services).

a) Clients in the *problem definition phase* want information on the pre-requisites and requirements for training, continuation training or a new occupational activity, on the income situation in certain occupations, on financial aids from the Labour Office and on important aspects of career choice or career change.

b) Clients who are still *fluctuating between occupational alternatives* request information on the contents of and requirements for vocational training or university studies. Furthermore, training or work in other countries also plays a role.

c) Clients who *already know precisely what they wish to do* appreciate information on training/work in other countries, on the prestige and career advancement chances of certain occupations, on working conditions and labour market trends for certain occupations.

d) Clients who come to the guidance interview with the *wish for information on implementation*, need information on institutions which provide information, on guidance and placement facilities offered by the Labour Office, on financial aids for initial and continuing training, on how to end unemployment.

The study also provided other important indications for the design of the interface between supply and demand for decision-relevant information. All interviewed persons mentioned the necessity of personal assistance for utilization of media offers. This request can be interpreted as a reaction to the confusing multitude of diverse differentiated information offers which the individual user cannot overview. That is why the wish was expressed for networked and regionalized systems which can be adapted to individual queries and search habits.

5. CONCLUSIONS

From CEDEFOP's comparative survey of the occupational profiles in vocational guidance in the European Union (cf. Watts, 1992/3) the following - despite all demarcation problems - features and shares of activity emerge:

a) Information management (about 27%)

Collection, target group-related processing and dissemination of information on

- Education and training
- Careers and occupations
- Labour market
- Support services

b) Work with individuals (about 21%)

- Assessment
- Information giving
- Counselling

c) Work with groups (about 12%)

- Teaching "careers education
- Group counselling
- Facilitating self help groups

d) Placement, Follow up (about 30%)

Networking (Supporting informal guidance sources, Advocacy, Feedback to providers)

e) Managing (about 10%)

- Internal (incl. service/programme planning and evaluation)
- External relations

With respect to Europe-related qualification of the guidance counsellor, CEDEFOP initiated the development of advanced training modules in which particular weight is attached to the design of demand-oriented information activities including information marketing (cf. Ertelt, 1992; Ertelt/Köditz/Chomé, 1992).

These modules serve the promotion of occupational mobility in the EU; to this end, European resources centres were institutionalized in the Member States within the framework of the PETRA programme and the LEONARDO programme.

But the European dimension of vocational guidance not only has a transnational but also a multi-cultural component. Here a number of individual characteristics should be taken into account (cf. Ertelt, Schulz, 1997):

- Attitude to training and occupation, to the value of general education and vocational education and to the importance of vocational qualification.
- The type and extent of performance motivation and its reference variables, above all the instrumentality of education and training for advancement, the level of desired attainment, goal and time structures and dependence on the family environment (personal control)
- Culture-related restrictions or preferences for certain occupations or activities.
- Language problems and certain communication habits with the danger of misunderstandings and incorrect information.
- Differences in cultural competence and behavioural competence for working life.
- Decision behaviour and decision competence in the family (more collective or more individual, more oriented to the criteria of the country of origin or to those of the present dominant culture).

This leads to critical questions on the theoretical concepts underlying vocational guidance and information in the EU Member States:

- Are the effects on the individual of affiliation to an ethnic group taken into account sufficiently?
- Do they stress the individual personality too much?
- Do they neglect the limitations on career development arising from socio-cultural, environment-conditioned and economic factors?
- Do they make it an absolute principle that all persons should have a self-determined choice?
- Do they overstress verbal communication, above all in the standard language?
- Do analytical, logical, rational methods predominate?

(On this cf. Sue/Sue, 1990; Capuzzi/Gross, 1995).

From this overview of our research findings and the transnational and multi-cultural dimension, the following conclusions emerge with respect to information aids for career problem-solving processes.

a) The main tasks today lie in the vitalization of demand for information and in a differentiated development of information supply oriented to this.

b) Demand orientation includes
  - Adaptivity to the individual problem (through qualified information counselling, branched access in depth and breadth, consideration of stage reached in problem-solving process)
  - User-friendliness (consideration of previous knowledge, language, learning capacity, individual learning habits, search heuristics, accustomed use of information systems)
  - Activation and motivation to make use of facilities, assistance for individual appraisal of success (input and yield of information activity must be subjectively satisfying), maintenance of image
  - Systematic participation of the users in the further development of the media system (development and evaluation).

c) The key dimension in demand for information is without doubt the individual stage reached in the decision-making process. This is not taken into sufficient consideration by the counsellors or is even felt to be dysfunctional. The reason for this could be certain notions of career choice processes, which are oriented to normative and rational process models or in which individual interests and inclinations of the client are overstressed, even if the latter does not think this is so.

d) On the supply side, networking, clarity of overview and comparability of information should clearly be improved. Here the essential factor is to have multi-level systems whose depth and breadth can be adapted to the users.Systematic registration and type categorization of user heuristics is absolutely essential for further development.

e) In order to eliminate impediments in the use of counselling and information services, special forms of information marketing should be developed which take account in particular of transnational and multi-cultural aspects. This concerns product policy, communication policy, distribution policy and compensation for services policy.

f) The surveys show an impressive picture of the importance of personal counselling aid in the use of information systems. This requires special training in demand-oriented information management, possibly with common European standards.

g) The establishment of a Europe-oriented guidance science with the focus on career decision-making processes and information management seems to be vital. The priority features are
  - Analysis of counselling interviews on vocational problem-solving
  - Comparative efficiency research dealing with guidance and information methods on the basis of extensive research on literature
  - Computer-assisted guidance and information systems in the vocational field
  - User analysis of national European resource centres
  - Comparative analysis of the qualification of vocational counsellors
  - Programme concentrating on the Central and Eastern European countries.

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APPRENTICESHIP: DEAD-END SECTORS AND OCCUPATIONS? IMPLICATIONS OF STRUCTURAL CHANGE ANDNEW EMPLOYMENT POSSIBILITIES FORAPPRENTICESHIP TRAINING

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1. INTRODUCTION

1.1 Background and research questions

The level of unemployment in the Member States of the European Union is still unacceptable. The roots of long-term unemployment may already lie in the transition from school to work. Unemployment rates among young people are high, in some countries extremely high.

Apprenticeship training (AT) seems to be a very promising form of education in this context. School and work each have their own culture which differ in many ways. AT combines both settings and is, in this way, well-suited to easing the transition from school to work. Several empirical studies confirm that former apprentices have relative good chances of finding a job[2].

However, to maintain this favourable position in the longer term, the apprenticeship system itself must be responsive to changes in the labour market. This responsiveness has a qualitative component as well as a quantitative component. The qualitative component refers to adjustments in the training content. In this respect AT has the advantage that companies and social partners are often directly involved. Therefore, it is easier to adapt this type of training to company needs.

Not only the work content within the economy changes but also the overall distribution of occupations and sectors within the economy (quantitative component). This article will address the sectoral and occupational distribution of AT in the light of developments in the overall labour market. It will be clear that the future prospects of AT are expected to be higher if:

- AT is concentrated in growing sectors and occupations.
- The distribution of AT over sectors and occupations adjusts to changes in the employment structure.
- AT is concentrated in sectors which are strongly innovative. For European countries innovation is an essential element to be able to compete in a globalised economy. So in the longer term highly innovative sectors are expected to have better prospects.
- AT is concentrated in sectors which offer good possibilities for continuing training. Continuing training makes an important contribution to updating skills and increasing productivity. AT can be seen as the first step to combining work and training. In this respect it is a good base for combining work and continuing training in later stages of people's careers. To what extent this life-long learning really takes place will be clearly related to the sectoral concentration because participation in continuing training varies considerably from sector to sector.

We will go into all of these dimensions in the following sections.

1.2 Definition

AT is a concept that is used in various different ways. Therefore, before discussing the methodology of the article we have to be more clearer as to which kind of training schemes are included. A more pedagogical type of definition of AT is the following:

Apprenticeship is a kind of alternance learning that takes place at two intrinsically different learning environments and that, due to the didactic-pedagogical integration of these two learning environments, gives added value.

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[2] An overview is given in the NEI-study for DG XXII: A. Gelderblom, J. de Koning and J. Stronach, The role of apprenticeship in enhancing employability and job creation, NEI, 1997.

This article is also partly inspired by the content of this study and the material collected in the framework of this study.

Various types of training come under this definition. We will make the following restrictions:

- The duration of the training has to be long enough to ensure that the training is more than a short course for gaining some work experience.
- The practical component leads to a true mastering of practical skills. This means that internships from full-time vocational schools which are more targeted towards only attaining a sense of the real world are not included. However, it remains very difficult to draw a clear border in this respect. What used to be full-time vocational educational systems are now developing their practical component (e.g. the Netherlands, Sweden and Spain). In Norway, the full-time vocational education system has even changed completely into an apprenticeship system.
- We limit ourselves to schemes which could be considered as initial training schemes. There are for example several schemes for unemployed adults which also have an alternating character, but which we do not take into account.

Within this more restricted definition, a distinction can be made between more types according to target group:

a) Apprenticeship training as part of the continuation of the "normal" educational path. This refers to the more "traditional" or "regular" types of apprenticeship training which are also labelled in that way in this text. Many studies restrict themselves to these types of schemes when discussing apprenticeship training[3].

b) Forms of apprenticeship training to improve the chances for young (potentially) unemployed people to enter the labour market. Compared to category a), these schemes are more directly targeted towards the groups which are more difficult to employ on the labour market. However, the structure of these schemes, for example the alternating character, has many similarities with category a). Moreover, in practice the growth of these types of schemes has often had a direct negative impact on the numbers of the more traditional types of AT. Examples of these types of schemes are Youth Training in the UK, Training-Employment Contracts in Italy and the *contracts* in France (especially the *contract de qualification* and *contract d'adaption).*

c) Apprenticeship types in higher education. Apprenticeship types of higher education are now developing. Sometimes this is within the institutional context of the traditional apprenticeship system (e.g. France), and sometimes separate schemes develop. In the latter case we restrict ourselves mainly to the *Berufsakademie* in Baden Württemberg (Germany).

All these three types of schemes of AT will be taken into account. However, more information and data are available for the first type. Moreover, these types of schemes are still the most dominant ones (see also table 1.1). So in practice this more traditional type of AT will receive a lot of attention.

In order to have a clearer insight into the types of schemes which are relevant, the following table gives a first overview of relevant schemes per country. The table also gives an impression of the relative importance of the different schemes. In some countries AT is much more important than in others. The table is meant to give a global overview. Changes follow each other very fast in this field, so every overview is quickly out of date and cannot claim to be exhaustive.

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[3] An example is the report by CEDEFOP, Ni Cheallaigh, 1995, which gives a very helpful overview of the characteristics of the schemes in the various countries.

Table 1.1:

Overview of schemes for apprentices

Country	Scheme	Proportion of young people who enter these types after full-time compulsory education*)	Number of participants (thousands)	Proportion of participants compared to total work-force
Austria	Dual system (a)	42% **)	123.4 (1995)	3.35%
Belgium	Commercial apprenticeships (category a) Industrial apprenticeships (a) Centres for part-time training (EDO/CEFA) (b) Occupation training contracts (b)	11%	10.6 (1992)	0.29%
Denmark	Initial vocational education, main course (a) EGU (since 1993) (b)	56%	82.2 (1993)	3.19%
Finland	Apprenticeship (a)		4.7 (1992) 12.7 (1995, incl. adults)	0.22% (1992)
France	Apprentissage (a, c) Contract de qualification (b) Contract d'adaption (b)	11% 12% (incl. also contract d'insertion)	250.6 (1995) 97 (inflow in 1993) 54 (inflow in 1993)	1.14% 0.44% 0.24%
Germany	Dual system (a) Vocational academies (c)	42%***)	1250.2 (West, 1995) 1580 (total, 1995) 11 (1994)	4.59% (West, 1994) 4.42% (total, 1995) 0.03% (1994)
Greece	Apprenticeship OAED (a)	3%	15 (1993)	0.40%
Ireland	Apprenticeship (a)	10%	15.5 (1992)	1.38%
Italy	Apprenticeship (a) Training-employment contracts (b)	4% 29%	449.8 (1993) 649.8 (1990)	2.21% 3.06%
Luxembourg	Apprenticeship (a)	13%	1.3 (1993)	0.64%
Netherlands	Apprenticeship (a, c)	20%****)	134.4 (1995)	1.98%
Portugal	Apprenticeship (a) Professional schools (a)	3%	12.6 (1995) 11.4 (1993)	0.29% 0.26%
Spain	Apprenticeship (formerly employment training contracts) (a/b) Training workshops and trade centres (b)	10%	99.3 (1993, employment-training contracts) 44.4 (1993)	0.84% 0.38%
Sweden		Hardly exists (well developed full-time vocational education system)		
United Kingdom	(modern) apprenticeship (a) Youth training, including skill seekers in Scotland (b)	34%	216 (1994) 273.4 (1995)	0.86% 1.05%

*) Estimate in PETRA report on "alternance", 1994.
**) Schneeberger, September 1992.
***) Tessaring, 1993 even gives a higher percentage, probably due to a different calculation method.
****) Estimation NEI.

1.3 Methodology

In order to discuss the responsiveness of AT in terms of sectoral and occupational distribution, we have collected the following data:

- Sectoral and occupational distribution of apprentices in the various countries. If possible this distribution is collected for several years so as to give an idea of the changes in this distribution.
- Sectoral and occupational distribution of the total labour market. An important source in this respect was the Labour Force Survey of Eurostat. Besides that, in a number of cases national data have also been used. We tried to collect data about more or less the same time periods as the apprenticeship data, so that a good comparison of changes in apprenticeship distribution and total employment distribution can be made.
- Scores for innovation indicators per sector. These scores are, in contrast to the scores mentioned above, restricted to the Netherlands. The innovation data per sector have been collected in the framework of a former NEI-study (Gelderblom/de Koning/van der Weijde 1996).
- Scores for participation in continuing training per sector. Here we used existing data of the participation in continuing training in some EU countries. Moreover, we used some Eurostat data on the participation in training in Craft-Dominated sectors and Non-Craft Dominated Sectors.

In the analysis we make the following comparisons:

- the distribution of apprentices over sectors/occupations vs. the distribution of total employment (section 2);
- changes over time in distribution of apprentices vs. the distribution of total employment (section 3);
- proportion of apprentices in a sector vs. the innovation scores of these sectors (section 4);
- participation in apprenticeship training in a sector vs. the participation in continuing training (section 5).

From these comparisons, we will try to draw conclusions on the future prospects of AT, from the angle of its distribution over sectors/occupations (section 6).

2. THE DISTRIBUTION OF APPRENTICES OVER SECTORS

In what kind of sectors and professions do apprentices work? How does this distribution over sectors relate to the overall distribution of employment over sectors? To have a first impression on these issues, table 2.1 gives the number of apprentices in specific sectors/occupations related to total employment in these sectors. Because existing statistics on employment and on the number of apprentices often do not use the same classification of sectors/professions, the figures used must be seen as approximations and not as exact figures. This is especially the case for the Netherlands and Italy.

A first important conclusion from table 2.1 is that the distribution of apprentices over sectors is very uneven. Within countries, the percentages vary strongly. Building and installation type of professions score very high in all countries. The proportion of apprentices in manufacturing are generally higher than in the service sector. If apprentices are involved in the service sector, then it often concerns the following activities: hotels and restaurants, (car) repair, (retail) trade and the care sector. Apprentices are found on a far smaller scale in the service sectors like business services, the government, banking and insurance and education.

Table 2.1:

The number of apprentices expressed as a percentage of total employment

Sector	Percentage of apprentices
Germany, total, 1989/1990	**5.3%**
Electrician	20.6%
Fitter/mechanic, etc.	15.2%
Food/provision	9.4%
Sale/trade	9.2%
Health services	5.6%
Administration / clerical	4.1%
Agriculture	3.2%
Technical professions	2.6%
Transport	0.7%
Other services	0%
Great Britain, total, 1996	**0.7%**
Construction	2.0%
Other services	1.3%
Manufacturing	0.8%
Distribution, hotels and restaurants	0.7%
Banking, finance and insurance	0.5%
Public administration, education and health	0.2%
Agriculture / Energy and water / Transport	0%
Italy, 1993/1994	**2.1%**
Manufacturing industries	5.4%
Building industries	3.3%
Tourism and commerce	1.8%
Energy	1.6%
Credit and insurance	0.8%
Other	0.5%
Mining	0.3%
Transport and communication	0.1%
Netherlands, 1992	**2.3%**
Repair services	14.5%
Building and installation	8.9%
Timber and furniture	5.0%
Other services	4.7%
Lodging and catering	4.2%
Metal and machinery industry	3.5%
Wholesale and retail	2.6%
Paper and printing products	2.1%
Textiles, clothing and shoe industry	1.7%
Chemical industry	1.7%
Banking and insurance	1.6%
Public service and health care	1.5%
Transport	1.4%
Food, beverage, tobacco industry	1.0%
Business services	0.6%
Government	0.3%
Culture, sports and recreation / exploitation, renting of immovables / education	0%

Sources:

Germany: Based on figures by Laszlo Alex, "Die duale Ausbildung in ständiger Bewährungsprobe", in: BIBB, *Perspectiven der dualen Berufsausbildung*, 1994.

Great Britain: *Labour Force Survey*.

Italy: Calculations based on the *European Observatory for SMEs, fourth annual report*, July 1996 and the *Labour Force Survey of 1993* of Eurostat.

Netherlands: NEI calculations based on the apprenticeship numbers of apprenticeship agencies. For the transformation of apprenticeship agencies towards sectors, the data of Borghans and Smits (1996) are used. Employment statistics come from the *Dutch Labour Force Survey*.

These kind of patterns are more or less confirmed when we look at the most important professional group of occupations within "regular" AT in some other countries (table 2.2). The table illustrates that the apprentices are often found in specific types of occupations: in the field of mechanics, metal, construction and installation, hairdressing, hotel and tourism, sales and (other) specific craft occupations. This is a picture which can be largely found in the regular apprenticeships in all countries. In Ireland, for example, apprenticeship occupations are only found in the following groups of occupations: construction, electricity, engineering, motor, printing, tourism and agriculture.

Portugal is a little bit an exception in table 2.2 because services, computer and banking are among the more important professions. However, it must be said in that context that the Portuguese system is still quite new and small. What will happen in the long run when the system develops further is difficult to say. The same is true for the new modern apprenticeship system in the UK. This new type of AT is now also available in sectors like chemical industry, information technology, polymers sector, accounting, air transport, estate agencies, road haulage, sports and recreation and insurance (source: MA starts/leavers database, Department for Education and Employment). However in quantitative terms, the most important sectors are still Engineering (18% of total starts from April 1995 to October 1996), Business administration (14%), Motor industry (9%), Hairdressing (8%), Retailing (7%) and Construction (7%). It should be borne in mind, however, that the more recent areas are still building up their numbers in this new scheme. A more definitive conclusion about this point can only be drawn at a later date when a "steady state" situation has been reached.

Table 2.2:

The most important groups of occupations among regular apprentices in Austria, Greece and Belgium

Belgium, French Community 1992	**Greece**, 1993/1994	**France**, 1994
Food (18%) Retail trading 16% Metals (13%) Personal care (13%) Mechanical engineering (12%) Stone construction (7%) Electricity (6%) Painting/furnishing(4%) Wood 4% Cultivation 3%	Motor engine eng. (18%) Electrician (16%) Machine technician (15%) Hairdressing (9%) Plumbing and heating (9%) Car body technician (7%) Carpentry/furniture(6%) Cutting and sewing (4%) Welding/metal construction (4%) Smith (2%)	Retail business (22%) Construction (19%) Hotel/catering (14%) Car-repair (11%) Breadmaking (11%) Hairdressing (19%) Other services (3%)
Austria, men, 1994	**Austria**, women, 1994	**Portugal**, 1995
Motor mechanic (10%) Electric installation (9%) Carpenter (9%) Bricklayer (6%) Retail trade (5%) Gas/heating/plumbing(4%) Engine benchman (4%) Benchman (3%) Cook (3%) Painter (3%)	Retail trade (30%) Hairdressing (15%) Office, sales (14%) Waiter and cook (5%) Cook (4%) Waiter (3%) Hotel-assistant (3%) Baker (2%) Industry, sales (2%) wholesale trade (2%)	Services (26%) Metal and machine tools (16%) Motor mechanics (7%) Hotel, catering and tourism (7%) Fishery (7%) Computers (7%) Electricity (5%) Farming and food industries (5%) Banking and insurance (5%) Carpentry and furniture (3%)

Sources:
- Updated country reports Greece and Belgium, CEDEFOP.
- *Berufsbildungsbericht 1995*, Bundesministerium für Wirtschaftliche Angelegenheiten.
- CEREQ, *Training and Employment*, no. 25, Autumn, 1996.
- IEFP (Portugal)

Although the training itself is highly concentrated in certain types of sectors and occupations, this does not mean that the distribution of ex-apprentices over sectors and professions is concentrated in the same way as well. The German *Berufsbildungsbericht* of 1996 (Bundesministerium für Bildung, Wissenschaft, Forschung und Technologie 1997) emphasises that certain standard flows of mobility take place, which lead to a less concentrated distribution of ex-apprentices. A standard flow of mobility takes place from craft to larger enterprises and service type sectors. The amount of apprentices in the craft sector is larger than the needs of the companies afterwards, while in the industrial companies and certain service sectors, the situation is the reverse. This situation is confirmed for Austria: former apprentices are found much more in the public sector, banking and transport than would be expected from the distribution of apprentices in training[4].

Information to date has focused on the regular apprentices. Another type of scheme are those more targeted towards the (potentially) unemployed. One of the largest schemes for the young (potentially) unemployed is Youth Training in the UK. Compared to regular apprentices, the trainees in Youth Training are more frequently found in service occupations (especially females). However, the type of service occupations are more or less the same as for regular apprentices: clerical and secretarial occupations, personal service occupations (in which the occupation hairdresser is represented) and other sales occupations.

A more or less similar conclusion can be drawn for the situation in Italy. According to the PETRA-report on "alternance", about 44% of the participants in training labour contracts work in the service sector. This is significantly higher compared to the regular apprentices in Italy. For the contract de qualification in France, more than 70% of the employers are found in the service sector (Chastand and Silberman in: Bilan de la politique de l'emploi en 1995).

Finally, we turn to the AT-type of schemes for higher vocational education. The trend in certain countries (especially the Netherlands and France) to broaden the existing regular apprenticeship training towards higher levels is closely linked to the possibilities of enlarging the domain of apprenticeship training. According to CEREQ (1996), the first consequence of the extension of apprenticeship training to all diploma levels was that the range of host companies was expanded. The large industrial companies, for example, some of which had broken with the practice of alternating training used in company schools, now offer places for apprenticeship. Another result of the upgrading of apprenticeship is the interest that this kind of contract has generated in new segments of the tertiary sector, such as financial bodies, consulting firms, hotel chains and mass marketing. This conclusion is confirmed for the Netherlands in which the growth of apprenticeship training for example in the processing industry is clearly linked to the higher levels of diploma which can be reached.

In Germany the Berufsakademie (vocational academy) is an apprenticeship type of higher vocational training which has developed separately from the regular AT-system. In this case the picture is quite different from the regular apprenticeship. More than 70% of the participants in 1994/1995 study in the field of (business) economics which includes areas like marketing, business EDP, taxes, etc. The other main fields are engineering (including technical EDP) and care areas (Zabeck and Zimmermann, 1995). Those who studied in the more business-oriented fields were employed two years later in the following professions: buying (7%), selling (25%), electronic data handling (11%), marketing (6%), consulting (9%), human resources (10%), accounting (9%).

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[4] If one compares the distribution of apprentices in training with the distribution of ex-apprentices over sectors, the latter has much higher proportions for the sectors mentioned. Both divisions can be found in the Berufsbildungsbericht 1995 of the Austrian Ministry of Economic Affairs. In Hofer and Pichelmann (1995) the mobility of ex-apprentices over sectors in Austria is confirmed.

3. CHANGES IN SECTORAL DISTRIBUTION

The overall division of employment over sectors and occupations changes. Some sectors and occupations grow, while other become less dominant. To what extent do the apprenticeship schemes adjust to these changes? Before we examine the sectoral shifts in AT, we will first briefly examine the main shifts in overall employment.

Looking at the developments in overall employment, the increasing importance of the service sectors is probably one of the most important trends for several years now. According to underlying data in the Labour Force Survey of 1995 of Eurostat, more than 64% of the working population in employment (EUR 12) is working in the service sectors. In 1986 this figure was considerably less, namely 58%.

A more disaggregate picture is given in Table t.1[5]. The proportions of all sectors outside the service sector are decreasing. Major growth has taken place in banking, finance, insurance and other services (which includes business services).

Table 3.1: **Proportion of sectors in total employment (EUR 10)**

Sector	1983	1991
Agriculture	7.7%	5.4%
Energy and water	1.9%	1.5%
Mineral extraction/chemicals	4.1%	3.6%
Metal manufacture/engineering	10.9%	10.4%
Other manufacturing	10.8%	9.8%
Building and civil engineering	8.1%	7.5%
Distributive trades, commerce, hotels and catering	18.4%	18.7%
Transport and communication	6.0%	6.0%
Banking, finance, insurance	6.5%	8.7%
Public administration	8.0%	7.8%
Other services	17.6%	20.6%
Total	100%	100%

Source: *Labour Force Surveys*, Eurostat.

Another important development in overall employment, which is relevant in the case of AT, is the position of craft-related occupations. The importance of these types of occupations has decreased from 21.7% in 1987 to 20.8% in 1991[6]. From the data from the European Observatory for SMEs (European Network for SME research, 1996), a further decline in the proportion of craft occupations can be deduced for the period 1991-1994, although this is not true for all depicted countries.

In the previous section we have seen that apprentices are often strongly represented in craft-related sectors and under-represented in service type sectors. So this means an over-representation of AT in less rapidly expanding sectors and an under-representation in relatively strong growing sectors. This under-representation in the service sector is all the more serious in the light of the following two factors:

a) Apart from the trend towards the increasing importance of the service sector, there is a trend towards the growing importance of service-related occupations within the production sector[7].

b) Within the service sectors, apprentices are found relatively often in the repair sector, trade and tourism. These service sectors are among the least fast growing ones within the service sectors (see table 3.1).

It is clear that the concentration of AT in the less rapidly growing sectors is a concern for the future prospects of AT. However, if there is a trend towards a broadening of the domain of AT in the growing sectors, then this issue is less problematic. In other words: is there a shift going on in AT towards growing sectors? How responsive is AT in terms of sectoral division?

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[5] This period has been chosen because of a change in sectoral classification in the Labour Force Survey by Eurostat. Because of this change it is not possible to compare the data from 1983 with a more recent year.

[6] Based on the European Observatory for SMEs, second annual report, April 1994.

[7] Cf. for example: Tessaring (1996)

The following two tables 3.2 and 3.3 give an impression of the growth over a longer period of AT in the different sectors in the Netherlands and Germany. In order to have an idea whether growth is considerably stronger in growing sectors, the employment growth in these sectors is also included in the tables. The sectors are ranked according to employment growth. Both tables show that generally speaking, the growth of apprenticeship at least partly follows the developments in the overall labour market. The number of apprentices has grown faster in sectors which have become larger.

Table 3.2:

Growth of employment and apprentices in different sectors, 1970-1994, Netherlands

Sector	Growth in employment[a)]	Growth in the number of apprentices
(Other) commercial services	+115%	+46%
Public service and health care	+95%	+323%
Exploitation, renting of immovables	+87%	- [b)]
Banking and insurance	+54%	+448%
Government (incl defense)		
Education	+40%	- [b)]
Repair services, lodging and catering	+27%	+66%
Trade	+20%	+364%
Transport	+18%	+232%
Other industries	+4%	+432%
Public utilities	+2%	- [b)]
Chemical industry (incl. oil and rubber industry)		
Paper and printing products	-10%	-62%
Agriculture and fishery	-23%	+410%
Food, beverage and tobacco industry	-26%	+56%
Building and installation	-27%	+20%
Metal, machinery and electrotechnical industry	-28%	-11%
Wood and furniture industry	-33%	-30%
Mineral extraction	-62%	- [b)]
Textiles and clothing industry	-74%	+11%
Total	+11%	+68%

a) Employment growth is expressed in terms of full-time equivalents (labour volume), because this is the only way to construct consistent data over such a long period.

b) Very few apprentices are to be found in these sectors. This situation has not changed over the period concerned.

Table 3.3:

Growth of employment and apprentices in different occupational groups, 1973-1990, Germany

Sector	Growth in employment, 1973-1989	Growth in the number of apprentices, 1975-1990
Other services	+123%	- [a)]
Health services	+74%	+37%
Administration/clerical	+19%	+28%
Technical professions	+19%	+11%
Sale and trade	+12%	+12%
Food/provisions	+8%	+6%
Fitter/mechanic	-3%	-6%
Electrician	-9%	+4%
Transport	-12%	0%
Agriculture	-45%	+10%
Total	+3%	+11%

a) Very few apprentices are to be found in these sectors. This situation has not changed over the period concerned.

Source: Laszlo Alex, Die duale Ausbildung in ständiger Bewährungsprobe, in: BIBB, *Perspectiven der dualen Berufsausbildung*, 1994.

The dynamics in the division over sectors/occupations in some other countries are summarised in table 3.4. In Italy and Denmark, the composition is quite static. In Austria the share of - over-represented - handwork and handicrafts has even increased.

Table 3.4:

Summary of changes in the sectoral composition of traditional AT in a few countries

Country	Period	Changes in distribution of apprentices over sectors/occupations
France	1979-1989	Growth of share of service sectors (trade, health and care, hotels)
Austria	1984-1995	Growth of handicraft and craft
Denmark	1984-1991	Distribution quite stable
Italy	1990-1994	Limited changes

Sources: France: *Direction de l'évaluation et de la prospective (DEP)*, cited in: Colliot and Brouch, *CEREC, bref*, April 1991
Austria: Wirtschaftskammer Austria, *Lehrlingstatistik*
Denmark: Updated country report on AT, prepared for CEDEFOP
Italy: The European Observatory for SMEs, fourth annual report. July 1996.

The overall conclusion is that in some countries the distribution of AT has adapted to changes in the composition of the overall labour market. However, this is certainly not the case for all countries. Moreover, the situation in which some sectors are clearly over-represented and others under-represented has not changed fundamentally.

One important remark has to be made on the former conclusion, namely that information so far only concentrated on regular apprentices. As already mentioned, other apprenticeship types of training have developed. These other types of AT have sometimes partly displaced the more traditional schemes. This served as a more indirect way of shifting apprenticeship training towards less traditional sectors. The schemes which were directed more towards the (potentially) unemployed are more often found in the service sector. Schemes for higher level AT are often directed towards growing fields like engineering and (business) economics.

4. INNOVATION AND THE SECTORAL CONCENTRATION OF APPRENTICES

In the previous section we have used employment growth as an indicator for the future prospects of apprenticeship training. If the apprentices are to be found in growth sectors and/or adapt to sectoral changes in the labour market, then this is one way of responding to changes, which enhances future prospects.

Another important indicator for future prospects is the extent to which innovation takes place in the sectors in which the apprentices are concentrated. Moreover, this relation could give an indication of the extent to which (former) apprentices play a role in the innovation process itself. If the apprentices are to be found relatively often in sectors with a high level of innovation, then this is an indication that they play an important role in innovation processes.

Are trainees in apprenticeship systems relatively often found in sectors with a high level of innovation? In order to answer this question, we compare the scores of several innovative indicators for different sectors in the Netherlands with the relative proportion of total trainees in the sectors. The innovation indicators per sector are already collected in the framework of a former NEI-study (Gelderblom/de Koning/van der Weijde 1996). They originally come from:

- analyses of data made available by the Organisation of Strategic labour Market Research;
- a study of Brouwer/Kleinknecht (1994) in the Netherlands on innovation in Dutch Industry and Services.

The following indicators are used:

a) proportion of renewed products in total turnover in the period 1990-1992;
b) proportion of Research and Development in total labour time;
c) proportion of companies in the sector which had product innovations in 1990-1992;
d) proportion of companies in the sector having applied for a patent;
e) proportion of workers in the sector that regularly use a PC or terminal during work.

A summary of the outcomes is presented in table 4.1. If the sectoral score is clearly higher than average, the symbol used is "+", if the score is very much higher, the symbol "++" will be used. In the reverse cases, the symbols "-" and "--" are used. In several cases there was no information (ni) about the innovation indicator in the sector. If there was no information, the working population of the sector has not been selected for the correlation. In the first column, in front of the scores for the indicators, the scores for the proportion of apprentices in total employment is given. The sectors are ranked according to this score, so the sectors with a relatively large number of apprentices are at the top and with relatively few apprentices are at the bottom of the table.

For each indicator, the correlation between the proportion of apprentices in the sector and the innovation score for the same sector is given. If this ratio is positive, then the innovation and the apprenticeship ratio is positively correlated (maximum is 1) if the ratio is negative, the opposite is true (minimum is -1).

The most important conclusion is that trainees in apprenticeship systems are found less frequently in sectors with a high level of innovation. The correlation between the score of the indicator and the proportions of apprenticeship are all negative although this negative relationship is not statistically significant for any of the indicators.

Looking at the different indicators, the correlation between process innovations and the number of apprentices in the sector is relatively negative which means that apprenticeship training seems to be mostly integrated in sectors producing according to relatively traditional methods. The correlation with other indicators, like research and development expenditure and applications for patents, is less negative and rather close to 0.

Apprentices are relatively often found in sectors with relatively low innovation scores: repair services, building and installation, lodging and catering and wholesale and retail. On the other hand, there are quite a lot of exceptions to this picture: some sectors with quite a lot of apprentices have quite high innovation scores, like the timber and furniture industry and the metal and machinery industry. So the overall relationship between AT and innovation is negative but this negative relationship is not a strong one. All in all, however, one could say that apprentices are not found very often in innovative sectors, which could be a threat to future prospects.

5. APPRENTICESHIP AND CONTINUING TRAINING

In the previous section, availability in innovative sectors is seen as important for the future prospects of AT. Another important element for future prospects is the link between AT and continuing training. In a rapidly changing world, life-long learning becomes a more and more important issue. Analyses have shown that participation in continuing training has a positive effect on productivity (Gelderblom/De Koning, 1992; Groot, 1994).

Table 5.1 reveals that in sectors with a lot of apprenticeship training, little continuing training takes place. The table concentrates on participation in AT and continuing training for on the one hand Craft Dominated Sectors (CDS) and on the other hand non-CDS. Not surprisingly, apprentices are found relatively often in CDS. However, participation in other types of training and education is limited. This result is clearly linked to the fact that CDS often consists of relatively small companies. It is known that continuing training takes place less often in small companies compared to larger ones.

Table 4.1:

Indicators of innovation and proportion of apprenticeship training in employment per sector

Sector	Appr./ employment (%)	Score indic 1	Score indic 2	Score indic 3	Score indic 4	Score indic 5
Repair services	14.5	-	ni	ni	ni	0
Building and installation	8.9	-	- -	- -	0	-
Timber and furniture industry	5.0	+	- -	++	0	+
Other services	4.7	0	ni	ni	ni	- -
Lodging and catering	4.2	- -	- -	0	- -	-
Metal and machinery industry	3.5	0	0	+	+	0
Wholesale and retail	2.6	0	- -	-	- -	-
Paper and printing industry	2.1	0	- -	++	0	+
Textiles/cloth./shoe industry	1.7	++	- -	+	-	-
Chemical industry	1.7	+	++	++	++	0
Banking and insurance	1.6	+	- -	+	-	++
Public service and health care	1.5	0	ni	ni	ni	-
Transport	1.4	- -	- -	- -	- -	0
Food, beverage and tobacco industry	1.0	0	-	++	-	0
Business service	0.6	0	0	+	-	+
Government	0.3	+	ni	ni	ni	++
Culture, sport and recreation	0[a]	+	ni	ni	ni	+
Exploitation/renting immovable goods	0[a]	-	0	+	-	+
Education	0[a]	0	ni	ni	ni	+
Oil exploitation	0[a]	ni	-	++	-	ni
Public utilities	0[a]	ni	-	++	-	ni
Communication	0[a]	ni	0	+	-	0
Electrotechn. industry	n.i.[b]	0	+	++	++	0
Correlation coefficient		-.240	-.201	-.442	-.143	-.237

Indicator 1:	new and innovative products in sales
Indicator 2:	research and development expenditure
Indicator 3:	level of process innovations in organisations
Indicator 4:	level of patent applications by organisations
Indicator 5:	relative use of computers by workers in organisations

A score of 100 is the average per indicator. The symbols refer to the following scores:

Indicator < 50 = - -
Indicator 50 < 75 = -
Indicator 75 < 125 = 0
Indicator 125 < 200 = +
Indicator > 200 = + +
n.i. = no information

a) In reality it will be somewhat higher. However, these numbers were so limited that these sectors were not separately mentioned in the underlying sources.

b) Proportion cannot be determined exactly but will be quite small, definitely less than 1%.

Table 5.1:

Participation of employees in apprenticeship and other types of training for Craft Dominated Sectors (CDS) and non-CDS, 1991, EU-12, excluding Italy

	Craft-Dominated Sectors	Non-CDS
Participation in apprenticeship + other types of dual training	3.3%	2.3%
Participation in other types of training and education	5.3%	10.7%

Source: *The European Observatory for SMEs, second annual report*, 1994. Original material comes from Eurostat.

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A more disaggregate picture can be shown for the Netherlands (table 5.2). The year 1986 is chosen, because for this year, the sectoral division for continuing training was far more disaggregate than for more recent years. The sectors are ranked according to the relative importance of AT. The table confirms that, in general, apprentices are found in sectors with relatively little investment in continuing training (correlation coefficient -0.39). The most important exception to this situation is the sector metal, machinery and electrotechnical industry with both high scores on apprenticeship as well as on continuing training.

Table 5.2:

Proportion of apprentices and participation in continuing training in the Netherlands, 1986

Sector	Proportion of apprentices in sector employment, 1986	Participation in continuing training, 1986
Building and installation	9.3%	8%
Hotels and repair	5.0%	9%
Metal, machinery and electrotechnical industry	3.7%	49%
Textiles and clothing industry	2.9%	11%
Paper and printing industry	2.3%	18%
Trade	2.1%	12%
Timber and furniture industry	2.0%	2%
Other commercial services	1.9%	23%
Agriculture	1.8%	4%
Other services	1.2%	19%
Oil and chemical industry	1.2%	63%
Banking and insurance	0.9%	71%
Transport	0.5%	32%
Food, beverage and smoking industry	0.5%	20%
Mining	0[a]	129%
exploitation and renting of immovable goods	0[a]	32%
Public utilities	0[a]	31%
Total[b]	4.2%	25%

a) In these sectors some apprentices will be found. However, the number will be very limited.

b) Excluding a number of (public) sectors.

Source: Apprentices: NEI-calculations, with CBS-data as underlying source. Continuing training: CBS (Central Bureau of Statistics, Netherlands).

The former data give an indication that apprentices - if they stay in the sectors in which they were trained - have fewer opportunities for receiving continuing training afterwards. This is confirmed by data about the German participation in continuing training which is lower for former apprentices than for other educated groups (Schumann and Zülke, 1996).

So making more connections between apprenticeship types of training and continuing training will be a critical factor for the future prospects of apprenticeship training in a rapidly changing world. Examples in this direction are the Finnish apprenticeship system which is now open to both young people and adults as well as several of the Dutch sectoral apprenticeship agents which are often closely linked to sectoral organisations offering continuing training courses. Because apprentices are already used to a combination of work and training, this group should have sufficient potential for combining learning and work in later stages in the career. To offer courses which clearly build on what is learnt in the initial apprenticeship training is a necessary condition for tapping this potential.

6. CONCLUSIONS

Apprenticeship training (AT) consists of a combination of theoretical training off the job and practical training, often within a company. From a pedagogical viewpoint, incorporating a real working situation into the learning process has many advantages. Moreover, the apprenticeship type of training is an attractive alternative for young people who do not like or fit into further full-time schooling. Apprenticeship can also be seen as a step between school and working life which smoothes the transition from school to work. The labour market position of former apprentices in terms of finding (and keeping) a job is quite good. Because of this potential, the concept of AT has been extended to higher levels of education and to training for the unemployed.

Although AT has so much potential, this is no guarantee that this type of training has good prospects for the future. The labour market is a very dynamic phenomenon. One of the changes taking place is that certain sectors and occupations become more important and others less. Concentrating on the sectoral dynamics, what could be said about the future prospects of AT? To what extent are the apprenticeship systems responsive to these types of changes?

In this paper we have looked to the sectoral distribution of AT from several angles:

- availability of AT in sectors and occupations with high growth rates;
- responsiveness of AT towards changes in the sectoral and occupational distribution of the total labour force;
- availability of AT in sectors with a high level of innovation;
- availability in sectors with a high level of participation in continuing training.

Regular apprentices are quite concentrated in certain types of sectors: metal, construction, (car) repair, hairdressing, trade and (other) craft-dominated sectors. In general these types of sectors and occupations are growing less than average. Employment growth is strong in the service sector, and especially in service areas in which apprentices are found less like business services, (road) transport, insurance, research, sports/recreation.

This picture has not structurally changed in the course of time. In countries like Germany, the Netherlands and France the distribution of apprentices changed somewhat in the direction of the growth sectors although this did not change the picture of large differences in representation over the various sectors. In other countries, the distribution over sectors is even more static.

Both innovation and participation in continuing training can be seen as important conditions for the future prospects of sectors. However, the sectors in which AT is traditionally strongly represented, score quite low on both. An analysis for the Netherlands shows that apprentices are not frequently found in sectors with a high level of innovation although the negative correlation between the proportion of apprentices and innovation is not a strong relationship.

Moreover, available evidence shows that participation in continuing training is low in typical AT sectors. This means that former apprentices have fewer possibilities to adapt to changes during their career through this channel. In the past, AT has been a sufficient means of securing the skills needed in these sectors. However, in a rapidly changing world, what is learnt in initial educational and training is no longer sufficient for an entire working life. However, the potential to improve this situation should exist because apprenticeship-type training is a combination of work and training and, in this respect, a sort of "first case" for combining the two in the later stages of a career. Making a good connection between initial apprenticeship training and continuing training is important in that respect.

So from several perspectives, the sectoral concentration of AT can be seen as a threat to future growth prospects of this type of training. This seemingly gloomy picture should be somewhat modified by three important findings:

- during their career former apprentices find their way into sectors in which apprenticeship training is not often found;
- examples show that the development in less traditional sectors is possible. The German case shows a large diffusion over many occupations and sectors. In a country like the Netherlands, AT is growing in the transport sector as well as in the process industry (chemicals);
- the shift to other sectors takes a more indirect path namely by the substitution of the traditional form of AT with other types. In this respect the development of other less regular apprenticeship schemes is interesting. Apprenticeship types of schemes for the potentially

unemployed are found more in the service sector, although they are concentrated in certain type of services which require limited skill levels. Moreover, the French experience with higher level diplomas within AT shows that new sectors like marketing, consulting firms and financial bodies can be reached. German types of training in higher levels of vocational education with an apprenticeship-type character are especially targeted towards business and technical occupations. So there is potential to reach new types of jobs.

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